

UNITED STATES GOVERNMENT  
MEMORANDUM

August 27, 2024

To: Public Information (MS 5030)  
From: Plan Coordinator, FO, Plans Section (MS  
5231)

Subject: Public Information copy of plan  
Control # - N-10242  
Type - Initial Exploration Plan  
Lease(s) - OCS-G36297 Block - 584 Green Canyon Area  
Operator - BP Exploration & Production Inc.  
Description - Drill and Sidetrack Wells A & C  
Rig Type - Not Found

Attached is a copy of the subject plan.

It has been deemed submitted as of this date and is under review for approval.

Tehirah Barkum  
Plan Coordinator

Site Type/Name	Botm Lse/Area/Blk	Surface Location	Surf Lse/Area/Blk
WELL/A	G36297/GC/584	2575 FNL, 7790 FEL	G36297/GC/584
WELL/B	G36297/GC/584	2484 FNL, 7672 FEL	G36297/GC/584
WELL/C	G36297/GC/584	1075 FNL, 7520 FEL	G36297/GC/584
WELL/D	G36297/GC/584	984 FNL, 7402 FEL	G36297/GC/584



**BP Exploration & Production Inc.  
Initial Exploration Plan  
Control No. N-10242  
“Far South”**

**Green Canyon Block 584  
Lease OCS-G 36297**

**BOEM - Record of Change  
Request for Information  
Updated 08/16/2024**

## RECORD OF CHANGE

Submittal Date	Requested By:	Amend er Initials	Amendment	Page #
06/20/2024	Tehirah Barkum, Plans Coordinator (BOEM)	AG	<ul style="list-style-type: none"> <li>Corrected Form 0137 to include Total Measured Depth on wells A, B, C, &amp; D.</li> </ul>	<ul style="list-style-type: none"> <li>Updated pages 2-9 of Form 0137 proprietary copy (Appendix A).</li> </ul>
06/27/2024	Tehirah Barkum, Plans Coordinator (BOEM)	AG	<ul style="list-style-type: none"> <li>Requested separate deep seismic sections for well paths "A" and "C" with labels</li> </ul>	<ul style="list-style-type: none"> <li>Updated figures in proprietary copy (Appendix C).</li> </ul>
07/01/2024	Tehirah Barkum, Plans Coordinator (BOEM)	AG	<ul style="list-style-type: none"> <li>Corrected Form 0137 to update open hole interval Top TVD for WCD.</li> <li>Provided a full and complete directional survey.</li> </ul>	<ul style="list-style-type: none"> <li>Updated page 10 of Form 0137 proprietary copy (Appendix A).</li> <li>Added directional survey with proprietary copy (Appendix C).</li> </ul>
07/15/2024	Tehirah Barkum, Plans Coordinator (BOEM)	AG	<ul style="list-style-type: none"> <li>Clarified that no plans were being made to discharge radioactive tracers or use any type of tracer with data acquisition.</li> </ul>	<ul style="list-style-type: none"> <li>No changes made to EP.</li> </ul>
07/17/2024	Tehirah Barkum, Plans Coordinator (BOEM)	AG	<ul style="list-style-type: none"> <li>Revised water discharge table after an error was discovered that radioactive tracers would be discharged during completion operations. No completion operations are planned for this well, hence, no sort of radioactive tracers will be used.</li> </ul>	<ul style="list-style-type: none"> <li>Updated water discharge table (Appendix D).</li> </ul> <p>Proprietary and Public Copies</p>
08/7/2024	Tehirah Barkum, Plans Coordinator (BOEM)	AG	<ul style="list-style-type: none"> <li>Updated Form 0137 to reflect earlier start date for drilling operations.</li> </ul>	<ul style="list-style-type: none"> <li>Updated pg.1 of Form 0137 (Appendix A).</li> </ul>



**BP Exploration & Production Inc.**

**Initial Exploration Plan  
Green Canyon Block 584  
(OCS-G 36297)**

**“Far South”**

**PUBLIC INFORMATION COPY**

0	06/11/2024		Adalberto Garcia	Brenda Linster
Rev	Date	Document Status	Custodian/Owner	Authority

**AMENDMENT RECORD**

Amendment Date	Revision Number	Amender Initials	Amendment

<b>Title of Document:</b>	Initial Exploration Plan – Far South	<b>Document Number:</b>	GM001-DR-PLN-600-00375730
<b>Authority:</b>	Brenda Linster	<b>Revision</b>	0
<b>Custodian/Owner:</b>	Adalberto Garcia	<b>Issue Date:</b>	06/11/2024
<b>Retention Code:</b>	ADM3000	<b>Next Review Date (if applicable):</b>	
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## 1 Plan Contents

### 1.1 Description of Activities

Under this Initial Exploration Plan for the Far South prospect, BP Exploration & Production Inc. (BP) proposes to drill two wells with surface locations and bottomhole locations in Green Canyon Block 584. There is also potential for production sidetrack. The primary well locations 'A' and 'C' have alternate mirror locations 'B' and 'D', respectively, which are included only for re-spud purposes. These mirror locations ('B' and 'D') ultimately target the same production horizon and will encounter the same sands on the path to the targeted bottom-hole locations as their respective primary 'A' and 'C' well locations.

BP will not be utilizing pile-driving or installing pipelines in this plan.

OCS Plan Information Forms (Form BOEM-0137) are included in **Appendix A**.

### 1.2 Location

A map at a scale of 1-in = 2,000-feet on an 8.5-in X 11-in sheet of paper that depicts the surface locations and water depths of the proposed wells is included in **Appendix B**. A bathymetry plat is also included in **Appendix B**.

### 1.3 Safety and Pollution Prevention Features

Safety and pollution prevention features utilized during drilling operations will include the use of appropriately designed casing and cement programs; appropriate blowout preventers, diverters, and other associated well equipment, appropriate mud monitoring equipment and sufficient mud volumes for well control; and properly trained personnel as described in 30 CFR Part 250, Subparts C, D, E, F, G, O and S, 30 CFR Part 550, Subparts B and C, and as further described in Notices to Lessees (NTLs). Appropriate fire drills and abandon ship drills will be conducted, and navigational aids, lifesaving equipment, and all other shipboard safety equipment will be installed and maintained as mandated by the U.S. Coast Guard regulations contained in 33 CFR Part 144.

### 1.4 Storage Tanks and Production Vessels

Information regarding the storage tanks and production vessels located on the drilling rig and support vessels that will store oil, as defined at 30 CFR 254.6 are provided in the tables below. Only those tanks with a capacity of 25 barrels or more are included.

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### 1.4.1 Storage Tanks DP Drillship

Type of Storage Tank	Type of Facility	Tank Capacity (bbls)	Tank Capacity (m3)	Number of Tanks	Fluid Gravity (API)
#1P Fuel Oil	Drillship	4133	657.1	1	38.57
#1S Fuel Oil	Drillship	4133	657.1	1	38.57
#2P Fuel Oil	Drillship	9344	1485.5	1	38.57
#2S Fuel Oil	Drillship	9344	1485.5	1	38.57
#3P Fuel Oil	Drillship	9049	1438.6	1	38.57
#3S Fuel Oil	Drillship	9036	1436.6	1	38.57
#1S FO Settler Tank	Drillship	447	71	1	38.57
#2P FO Settler Tank	Drillship	447	71	1	38.57
#1 FO Service Tank ER1	Drillship	194	30.8	1	38.57
#2 FO Service Tank ER1	Drillship	194	30.8	1	38.57
#1 FO Service Tank ER2	Drillship	194	30.8	1	38.57
#2 FO Service Tank ER2	Drillship	194	30.8	1	38.57
#1 FO Service Tank ER3	Drillship	219	34.8	1	38.57
#1 FO Service Tank ER3	Drillship	217	34.5	1	38.57
Lube oil Storage	Drillship	465	74	1	25.72
Base oil P	Drillship	3603	572.8	1	41.06
Base oil S	Drillship	3607	573.4	1	41.06

### 1.4.2 Storage Tanks Support Vessels

Type of Storage Tank	Type of Facility	Tank Capacity (bbls)	No. of Tanks	Total Capacity (bbls)	Fluid Gravity (API)
Fuel Oil	Supply Boat (Typical 280feet)	450	16	7,200 bbls dependent on other cargo carried	31.14

## 1.5 Additional Measures

In addition to the safety, pollution prevention and early spill detection measures that may be required by applicable regulations, BP will rely on its Operating Management System (OMS) to help deliver safe and reliable operations.

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OMS is a system of interdependent activities that drive how BP will actually perform work and comply with internal and external standards and regulations. Within OMS, BP has also implemented a Safety Environmental Management System (SEMS) in accordance with 30 CFR 250 Subpart S, which provides a systematic way to identify risks, potential impacts, and compliance requirements that need to be managed. BP presented to the BOEMRE a report entitled *Deepwater Horizon Containment and Response: Harnessing Capabilities and Lessons Learned*. This document assesses the capabilities that are now available to respond to oil spills in the GoM. Additionally, the measures described in Appendices A, B, C and J of the NMFS 2020 Biological Opinion, as amended 2021, will be implemented as applicable to the activities outlined in this document, specifically, with regards to any external hanging equipment that may present potential entanglement hazard for protected species.

## 2 General Information

### 2.1 Applications and Permits

The table below provides information on the filing or approval status of the individual and/or site-specific Federal, State and local application approvals or permits, which must be obtained to conduct the proposed activities.

Application / Permit	Issuing Agency	Status
General NPDES Permit	EPA	Existing
Application for Permit to Drill	BSEE – New Orleans District	Pending Submittal
Emergency Evacuation Plan	USCG	Pending Submittal

### 2.2 Drilling Fluids

A table providing information on the types (including chemical constituents) and amounts of the drilling fluids that are planned to be used to drill the proposed wells is included below:

**Drilling Fluids per Well (230 days)**

Type of Drilling Fluid	Estimated Volume of Drilling Fluid to be Used Per Well
Water based (seawater, freshwater, barite)	140,000 bbls
Oil based (diesel, mineral oil)	NA
Synthetic based (internal olefin, ester)	30,000 bbls

*NOTE: Water based mud (WBM) calculations include the option to re-spud the well. WBM volume is twice the anticipated amount required to drill to the TD of the surface casing. This value includes WBM and seawater as needed. Estimated volume is 70,000 bbls without re-spud.*

### 2.3 New or Unusual Technology

In accordance with the definition of “new or unusual technology” set forth in 30 CFR § 550.200, exploration activities in Green Canyon Block 584 will utilize the following:

- Managed Pressure Drilling (MPD) technology to mitigate non-productive events associated with pore pressure / fracture gradient (PPFG) uncertainty.

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- An installed Stemless Gate Valve (SGV) as a part of the riser or LMRP to trap pressure with MPD as required during well construction. The SGV will reduce BOP element cycles when trapping applied surface back pressure.

## 2.4 Bonding Information

The bonding requirements for the activities proposed in this Exploration Plan are satisfied by an area-wide bond, furnished and maintained according to 30 CFR Part 556, Subpart I, and NTL No. 2015-N04, and to the extent required under 30 CFR 556.901 and National NTL No. 2016-N01.

## 2.5 Oil Spill Financial Responsibility (OSFR)

BP (Operator No. 02481) has demonstrated oil spill financial responsibility for the facilities proposed in this EP according to 30 CFR Part 553, and NTL No. 2008-N05, "Guidelines for Oil Spill Financial Responsibility for Covered Facilities."

## 2.6 Deepwater Well Control

BP (Operator No. 02481) has the financial capability to drill a relief well and conduct other emergency well control operations.

## 2.7 Blowout Scenario

### 2.7.1 Blowout Scenario

The blowout scenario assumes that the pipe has been tripped out of the hole when a problem with the wellhead connector develops, resulting in the removal of the BOP stack. Due to the loss of riser margin, the well flows unrestricted. Day 1 worst case discharge (WCD) at location 'C' is 180,000 bopd, with the calculation support package for this rate attached as **Appendix F** in the Proprietary copy of this Exploration Plan. The maximum duration of the blowout is estimated at 70 days. The rate profile associated with the well blowout over this 70-day period (also included in **Appendix F** in the Proprietary copy of this Exploration Plan) results in a potential worst case spill volume estimated at 10.5 mmstbo.

### 2.7.2 The Potential for the Well to Bridge Over (verify or modify)

While bridging is possible due to generally low formation strengths in the Gulf of Mexico, no bridging was assumed in the 'worst case scenario'. The open hole intervals experienced on each well have multiple formations open simultaneously. The modeling of the failure point of the weakest interval includes many variables, and using no bridging yields a maximum flow potential.

### 2.7.3 The Likelihood for Surface Intervention to Stop the Blowout (Verify or modify)

The likelihood for above-mudline intervention to stop a blowout is dependent on the failure mechanism. Depending on the circumstances, BP may address a failure of the BOP stack by repairing the control system via ROVs, replacing

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the BOPs, or adding a BOP on top of the current BOP stack. Failure of the wellhead or casing would be more difficult and require clear access to the well below the failure point in order to run drill pipe and/or tools in the well.

In addition to BP’s internal well containment and emergency response planning, BP has contracted resources to assist in the event of a blowout. Further, BP is a member of the Marine Well Containment Company (“MWCC”), currently has access to MWCC’s Interim Containment Response System (“ICRS”) and will have full access to MWCC’s Expanded Containment Response System when it is available.

#### 2.7.4 The Availability and Timing of a Rig to Drill a Relief Well

The table below lists the Mobile Offshore Drilling Units (MODU) that are capable of drilling a relief well. The estimated time to spud is 3 to 10 days, pending requirements to safely secure the current operations of the MODU, required material logistics, mobilization to location, and regulatory approvals. The possibility of drilling a relief well from a neighboring platform or land is not applicable to operations proposed in this Exploration Plan; there is no existing infrastructure in the vicinity of Green Canyon Block 584, but none that would impede drilling a relief well.

Parameters	Black Lion (Main Derrick)	Black Hornet (Main Derrick)	Stena IceMax (Main Derrick)
<b>Proposed Utility in Response</b>	Wellbore Capping / Relief Well	Wellbore Capping / Relief Well	Wellbore Capping / Relief Well
<b>Current Location</b>	GoM	GoM	GoM
<b>Contract Expire Date</b>	11/15/2027	06/15/2027	03/01/2028
<b>Rated WD (ft)</b>	12K	12K	10K
<b>Rated TD (ft)</b>	40K	40K	35K
<b>Rated BOPs (psi)</b>	15K	15K	15K
<b>Derrick Capacity</b>	4MM	4MM	2MM
<b>Moor Type</b>	DP	DP	DP
<b>Relevant Drill Package Limitations</b>	SHDH4 connector	SHDH4 connector	SHDH4 connector

The estimated time to drill a relief well is: 10 days to mobilize and spud, 25 days from spud to casing shoe above WCD zone, plus 35 days for ranging, intersection, and kill operation—for a total of 70 days.

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## 2.7.5 Measures that Would Enhance the Ability to Prevent a Blowout

Measures employed to prevent a blowout include compliance with applicable regulations (30 CFR Parts 250 and 550) and current NTLs. Additional measures include the following:

1. Volume measurements relative to the well will be monitored at all times during all operations.
2. Flow checks before leaving bottom, after pulling into shoe, and before BHA enters stack.
3. BP representative shall observe well conditions prior to each trip and after well kills or testing.
4. BP representative shall be the only person authorized to initiate opening the well as part or at the conclusion of well control measures.
5. On rig JSA/contingency plan before running any non-shearable tools or pipe through the BOP stack.
6. BP has a 24/7 monitoring center, Regional Collaboration Center (RCC) (formerly referred to as the 'Houston Monitoring Center (HMC)'), located at BP's Westlake Campus. Through continuous monitoring, onshore staff have the ability to communicate issues they observe on the well with the Wells Superintendent and Wells Engineer, as well as the rig. The rig team can then make corrective actions as necessary.

In addition to the additional measures listed above, BP has adopted the following performance standards:

1. BP will use and will require its contractors involved in drilling operations to use, subsea blowout preventers (BOPs) equipped with no fewer than two blind shear rams and a casing shear ram on all drilling rigs under contract to BP for deepwater service operating in dynamic position mode. With respect to moored drilling rigs under contract to BP for deepwater drilling service using subsea BOPs, the subsea BOP will be equipped with two shear rams, which will include at least one blind shear ram and either an additional blind shear ram or a casing shear ram.
2. Each time a subsea BOP from a moored or dynamically positioned drilling rig is brought to the surface and testing and maintenance on the BOP are conducted, BP will require that a third party verify that the testing and maintenance of the BOP were performed in accordance with manufacturer recommendations and API Std 53.

## 2.7.6 Measures that Would Reduce the Likelihood of a Blowout

Measures to reduce the likelihood of a blowout include compliance with applicable regulations (30 CFR Parts 250 and 550) and current NTLs. Additional measures:

1. Minimize any influx events to the wellbore by using the best pore pressure / fracture gradient predictions available, using down-hole tools when appropriate, such as PWD and/or LWD to monitor the wellbore and update pore pressure / fracture gradient predictions;
2. Management of Change process is in place for all procedure changes;
3. A Well Control Response Guide is in place; and
4. With the integration of the Regional Collaboration Center (RCC) (formerly referred to as the 'HMC'), BP has staff monitoring wells 24/7. Having a monitoring center away from the rig in a controlled environment gives BP the opportunity to evaluate data real time and communicate issues to the Wells Superintendent and Wells Engineer, as well as the rig.

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## 2.7.7 Measures which Would Enhance the Ability to Conduct Early Intervention

Measures to enhance the ability to conduct early intervention in addition to the regulation and NTL requirements include:

1. Possible relief well locations have been identified and screened for general acceptability. In the event of a blow out or other event necessitating a relief well, data will be collected post-event to ensure that previously identified relief well locations are still valid, or to assist in determining alternate relief well locations if required;
2. Wellhead equipment and sufficient casing is identified and available for a relief well;
3. A rig(s) is identified and available for a relief well;
4. A Well Control Response Guide is in place; and
5. An Incident Management System (IMS) is in place.
  - The BP IMS is comprised of government-approved plans covering various scenarios; Incident Management Teams are trained annually in the Incident Command System, which is a part of the National Incident Management System; BP has access to response capability through various contractors and technical specialists; and to pre-designated facilities, where the teams can provide adequate oversight to the response.

## 2.7.8 Other Measures

All proposed activities and facilities in this EP will be covered by the GoM Regional OSRP filed by BP America Inc. (Operator No. 21372) under cover letter dated October 7, 2022 on behalf of several companies listed in the plan including BP Exploration & Production Inc. (Operator No. 02481). The OSRP was confirmed in compliance and approved by BSEE on November 29, 2022.

## 3 Geological and Geophysical Information

### 3.1 Geological Description

A discussion of the geological objectives, including a brief description of the hydrocarbon trapping elements, is included in **Appendix C** in the Proprietary Information copies of this Exploration Plan.

### 3.2 Structure Contour Maps

Current structure contour maps are included in **Appendix C** in the Proprietary Information copies of this Exploration Plan.

### 3.3 Interpreted 2-D and/or 3D Seismic Lines

Migrated and annotated 3-D seismic lines with depth scale within 152 meters (500 feet) of the proposed surface locations are enclosed with the site clearance letters included in **Appendix C** in the Proprietary Information copies of this Exploration Plan.

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### 3.4 Geological Structure Cross-Section Maps

Interpreted geological structure cross-section maps are included in **Appendix C** in the Proprietary Information copies of this Exploration Plan.

### 3.5 Shallow Hazards Report

An Autonomous Underwater Vehicle (AUV) site survey was conducted for BP by Oceaneering International, Inc. (OII) between September 16-27, 2023. The survey data was acquired across Green Canyon (GC) Blocks 540 and 584. The shallow hazards interpretation of the data was included in the 2024 OII report noted below.

The OII geohazards report integrated the 2023 AUV site survey data with 3D seismic data to generate a regional shallow hazards report. The report is entitled "Archaeological and Geohazard Assessment, Blocks 540 (OCS-G-37531) and 584 (OCS-G-36297), Green Canyon Area, Gulf of Mexico, OII Report No. 227580-OII-RPT-AAG-01."

### 3.6 Shallow Hazards Assessments (Site Clearance Letters)

Shallow hazards assessment (site clearance letters) that evaluate the seafloor and subsurface geologic and manmade features and conditions, for the proposed locations in are included in **Appendix C** of this Exploration Plan.

### 3.7 High Resolution Seismic Lines

Seismic sections through the proposed well locations are included in the shallow hazards assessments (site clearance letters) in **Appendix C** of this Exploration Plan.

### 3.8 Stratigraphic Column

A generalized biostratigraphic / lithostratigraphic column is included in **Appendix C** in the Proprietary Information copies of this Exploration Plan.

### 3.9 Time vs. Depth Information

Time vs. Depth information is included in **Appendix C** in the Proprietary Information copies of this plan.

## 4 Hydrogen Sulfide (H<sub>2</sub>S) Information

### 4.1 Concentration

Anticipated H<sub>2</sub>S concentration is 0 ppm, based on offset well data in Green Canyon Block 627, Block 452, Block 404, and Block 320. Based on offset correlative analogue data, H<sub>2</sub>S is not expected to be encountered during the operations proposed herein.

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## 4.2 Classification

Based on correlative information no H<sub>2</sub>S is known to occur in the project area. BP requests BOEM confirm an “H<sub>2</sub>S absent” classification.

## 4.3 H<sub>2</sub>S Contingency Plan

No H<sub>2</sub>S is documented in the offset wells in and around the project area, nor in nearby producing fields. Reservoirs have low temperature (< 100 C) and lack a sulfate source. Bottom-up model predicts no H<sub>2</sub>S. Therefore, no H<sub>2</sub>S contingency plans were needed.

## 4.4 Modeling Report

No H<sub>2</sub>S is documented in the offset wells in and around the project area, nor in nearby producing fields. Reservoirs have low temperature (< 100 C) and are lack of sulfate source. Bottom-up model predicts no H<sub>2</sub>S. Therefore, no further model reports were needed.

# 5 Biological, Physical, and Socioeconomic Information

## 5.1 Benthic Communities Report

The BOEM requires site-specific surveys and reviews for proposed bottom-disturbing actions in water depths greater than 300-m in order to judge the potential of the region for supporting high density benthic communities, including chemosynthetic organisms. NTL No. 2009–G40 formalized the process. BP has conformed to this requirement and has located wells to avoid potential sites for benthic communities during the activities described by this plan.

Green Canyon Block 584 is located in water depths greater than 300-m; At these depths, the potential exists for high-density benthic communities, including chemosynthetic communities to be present. A Site Clearance Survey was conducted by Oceaneering International, Inc. (OII) in 2023 across GC540 and GC584. OII performed an integrated geohazard assessment of this data that included assessment of the potential for high-density benthic communities (OII Report No. 227580-OII-RPT-AAG-01). Here are the findings related to potential high-density benthic communities as stated in the OII integrated report.

Numerous prominent features interpreted as hardground areas were identified within the study area. These hardground areas may possess the potential to harbor deepwater high-density benthic communities. These prominent features are typically found in proximity to the escarpment and the fault scarp in Block GC540. Numerous smaller sites are located around the larger sites through the study area. Furthermore, the hardground areas are located within the southwestern portion of Block GC540 and in a general NW-SE trend through block GC584 in proximity to the escarpment. The noted features at times display shallow gas at or near the seafloor with irregular seafloor, seafloor amplitude anomalies and indications of hard seafloor sediments such as high backscatter/intensity and side scan sonar reflectivity. These potential benthic community habitats should be avoided by the BOEM-recommended 250-foot pipeline avoidance and 2,000-foot muds and cuttings avoidance.

The proposed well locations lie greater than 2,000ft from all hardground interpretation, avoiding any potential high-density benthic communities by a minimum of 2,000ft. The Site Clearance Letters and Shallow Hazard Report outlining these findings are contained in **Appendix C**.

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## 5.2 Biologically Sensitive Underwater Features and Areas

The proposed activities will be conducted in water depths of approximately 4,100 ft. Therefore, requirements of NTL 2009-G39 for biologically sensitive underwater features and areas such as Topographic Features, Live Bottom (low-relief), Live Bottom (Pinnacle Trend) features, and other potentially sensitive biological features when conducting OCS operations in water depths less than 300-m (984-ft) in the Gulf of Mexico do not apply to this plan.

All proposed bottom-disturbing activities in this EP will occur outside of the nearest Topographic Features, “No Activity Zones”, Live Bottom (low Relief), and Live Bottom (Pinnacle Trend) Stipulation Blocks described in NTL 2009-G39 and shown on BOEM December 2012 Map: “Biologically Sensitive Areas (< 300-m)”.

## 5.3 Remotely Operated Vehicle (ROV) Monitoring Survey Plan

No longer applicable. NTL 2008-G06 “Remotely Operated Vehicle Surveys in Deepwater” has expired.

## 5.4 Threatened or Endangered Species, Critical Habitat and Marine Mammal Information

This section discusses species listed as Endangered or Threatened under the Endangered Species Act (ESA). In addition, it includes all marine mammal species in the region, all of which are protected under the Marine Mammal Protection Act (MMPA).

Endangered or Threatened species that may occur in the project area and/or along the northern Gulf Coast are listed in EIA Table 6. The table also indicates the location of critical habitat (if designated in the Gulf of Mexico). Critical habitat is defined as (1) specific areas within the geographical area occupied by the species at the time of listing, if they contain physical or biological features essential to conservation, and those features may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species if the agency determines that the area itself is essential for conservation. The NMFS has jurisdiction for ESA listed marine mammals (cetaceans), sea turtles, and fishes in the Gulf of Mexico. The USFWS has jurisdiction for ESA listed birds, the West Indian manatee (*Trichechus manatus*), and sea turtles while on their nesting beaches.

EIA Table 6. Federally listed Endangered and Threatened species potentially occurring in the project area and along the northern Gulf Coast. Adapted from: U.S. Fish and Wildlife Service (2020) and National and Oceanic Atmospheric Administration Fisheries (2020).

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in Gulf of Mexico
			Project Area	Coastal	
Marine Mammals					
Rice’s whale <sup>1</sup>	<i>Balaenoptera ricei</i>	E	X	--	None
Sperm whale	<i>Physeter macrocephalus</i>	E	X	--	None
West Indian manatee	<i>Trichechus manatus</i> <sup>2</sup>	T	--	X	Florida (Peninsular)
Sea Turtles					

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Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in Gulf of Mexico
			Project Area	Coastal	
Loggerhead turtle	<i>Caretta caretta</i>	T,E <sup>3</sup>	X	X	Nesting beaches and nearshore reproductive habitat in Mississippi, Alabama, and Florida (Panhandle); <i>Sargassum</i> habitat including most of the central & western Gulf of Mexico.
Green turtle	<i>Chelonia mydas</i>	T	X	X	None
Leatherback turtle	<i>Dermochelys coriacea</i>	E	X	X	None
Hawksbill turtle	<i>Eretmochelys imbricata</i>	E	X	X	None
Kemp's ridley turtle	<i>Lepidochelys kempii</i>	E	X	X	None
<b>Birds</b>					
Piping Plover	<i>Charadrius melodus</i>	T	--	X	Coastal Texas, Louisiana, Mississippi, Alabama, and Florida (Panhandle)
Whooping Crane	<i>Grus americana</i>	E	--	X	Coastal Texas (Aransas National Wildlife Refuge)
Black-capped Petrel	<i>Pterodroma hasitata</i>	E	X	--	None
Rufa Red Knot	<i>Calidris canutus rufa</i>	T	--	X	None
<b>Fishes</b>					
Oceanic whitetip shark	<i>Carcharhinus longimanus</i>	T	X	--	None
Giant manta ray	<i>Mobula birostris</i>	T	X	X	None
Gulf sturgeon	<i>Acipenser oxyrinchus desotoi</i>	T	--	X	Coastal Louisiana, Mississippi, Alabama, and Florida (Panhandle)
Nassau grouper	<i>Epinephelus striatus</i>	T	--	X	None
Smalltooth sawfish	<i>Pristis pectinata</i>	E	--	X	Southwest Florida
<b>Invertebrates</b>					
Elkhorn coral	<i>Acropora palmata</i>	T	--	X	Florida Keys and the Dry Tortugas
Staghorn coral	<i>Acropora cervicornis</i>	T	--	X	Florida Keys and the Dry Tortugas
Pillar coral	<i>Dendrogyra cylindrus</i>	T	--	X	Southeast Florida and Florida Keys, Puerto Rico, St. Thomas, St. John, St. Croix, and Navassa Island
Rough cactus coral	<i>Mycetophyllia ferox</i>	T	--	X	Southeast Florida and Florida Keys, Puerto Rico, St. Thomas, St. John, St. Croix, and Navassa Island
Lobed star coral	<i>Orbicella annularis</i>	T	--	X	Southeast Florida and Florida Keys, Puerto Rico, St. Thomas, St. John, St. Croix, Navassa Island, East and West Flower Garden Banks, Rankin Bright Bank, Geyer Bank, and McGrail Bank
Mountainous star coral	<i>Orbicella faveolata</i>	T	--	X	Southeast Florida and Florida Keys, Puerto Rico, St. Thomas, St. John, St. Croix, Navassa Island, East and West Flower Garden Banks, Rankin Bright Bank, Geyer Bank, and McGrail Bank
Boulder star coral	<i>Orbicella franksi</i>	T	--	X	Southeast Florida and Florida Keys, Puerto Rico, St. Thomas, St. John, St. Croix, Navassa Island, East and West Flower Garden Banks, Rankin Bright Bank, Geyer Bank, and McGrail Bank
Panama City Crayfish	<i>Procambarus econfinae</i>	T	--	X	South-central Bay County, Florida
Queen conch	<i>Aliger gigas</i>	T	--	X	None

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Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in Gulf of Mexico
			Project Area	Coastal	
<b>Terrestrial Mammals</b>					
Beach mice (Alabama, Choctawhatchee, Perdido Key, St. Andrew)	<i>Peromyscus polionotus</i> subsp. <i>ammobates</i> , <i>allophrys</i> , <i>trissyllepsis</i> , and <i>peninsularis</i> , respectively	E	--	X	Alabama and Florida (Panhandle) beaches
Florida salt marsh vole	<i>Microtus pennsylvanicus dukecampbelli</i>	E	--	X	None

E = Endangered; T = Threatened; X = potentially present; -- = not present.

<sup>1</sup> In 2021, National Marine Fisheries Service recognized that what had previously been accepted as a subspecies of the Bryde's whale is actually a separate species. The reclassification is formerly recognized under 86 FR 47022 effective date 22 October 2021 as the Rice's whale (*Balaenoptera ricei*).

<sup>2</sup> There are two subspecies of West Indian manatee: the Florida manatee (*T. m. latirostris*), which ranges from the northern Gulf of Mexico to Virginia, and the Antillean manatee (*T. m. manatus*), which ranges from northern Mexico to eastern Brazil. Only the Florida manatee subspecies is likely to be found in the northern Gulf of Mexico.

<sup>3</sup> The Northwest Atlantic Ocean Distinct Population Segment (DPS) of loggerhead turtles (*Caretta caretta*) is designated as Threatened (76 Federal Register [FR] 58868). The National Marine Fisheries Service and the U.S. Fish and Wildlife Service designated critical habitat for this DPS, including beaches and nearshore reproductive habitat in Mississippi, Alabama, and the Florida Panhandle as well as *Sargassum* spp. habitat throughout most of the central and western Gulf of Mexico (79 FR 39756 and 79 FR 39856).

Coastal Endangered or Threatened species that may occur along the U.S. Gulf Coast include the West Indian manatee, Piping Plover (*Charadrius melodus*), Ruda Red Knot (*Calidris canutus rufa*) Florida salt marsh vole (*Microtus pennsylvanicus dukecampbelli*), Panama City crayfish (*Procambarus econfinae*), Whooping Crane (*Grus americana*), Gulf sturgeon (*Acipenser oxyrinchus desotoi*), smalltooth sawfish (*Pristis pectinata*), Queen conch (*Aliger gigas*) and four subspecies of beach mouse. Critical habitat has been designated for all of these species (except the Florida salt marsh vole) as indicated in **Table 6** and discussed in individual sections. Two other coastal bird species (Bald Eagle [*Haliaeetus leucocephalus*] and Brown Pelican [*Pelecanus occidentalis*]) are no longer federally listed as Endangered or Threatened; these are discussed in **Section EIA C.4.2**.

Five sea turtle species, the Rice's whale (*Balaenoptera ricei*), sperm whale (*Physeter macrocephalus*), oceanic whitetip shark (*Carcharhinus longimanus*), and giant manta ray (*Mobula birostris*), and the Black-capped Petrel (*Pterodroma hasitata*) are the only Endangered or Threatened species that could potentially occur within the project area. The listed sea turtles include the leatherback turtle (*Dermochelys coriacea*), Kemp's ridley turtle (*Lepidochelys kempii*), hawksbill turtle (*Eretmochelys imbricata*), loggerhead turtle (*Caretta caretta*), and green turtle (*Chelonia mydas*) (Pritchard, 1997). Effective 11 August 2014, NMFS has designated certain marine areas as critical habitat for the Northwest Atlantic Distinct Population Segment (DPS) of the loggerhead sea turtle (see **Section C.3.5**). No critical habitat has been designated in the Gulf of Mexico for the leatherback turtle, Kemp's ridley turtle, hawksbill turtle, green turtle, or the sperm whale.

Four Endangered mysticetes (blue whale [*Balaenoptera musculus*], fin whale [*Balaenoptera physalus*], North Atlantic right whale [*Eubalaena glacialis*], and sei whale [*Balaenoptera borealis*]) have been reported in the Gulf of Mexico, and are considered rare or extralimital (Würsig et al., 2017). These

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species are not included in the most recent NMFS stock assessment report (Hayes et al., 2022) nor in the most recent BOEM multisale EIS (BOEM, 2017); therefore, they are not considered further in the EIA.

The Rice’s whale exists in the Gulf of Mexico as a small, resident population. This species was formally known as a subspecies to the Bryde’s whale (*Balaenoptera edeni brydei*) until a DNA study identified it as a separate species (Rosel et al., 2021). It is the only baleen whale known to be resident to the Gulf of Mexico. The species is severely restricted in range, being found only in the northeastern Gulf in the waters of the DeSoto Canyon (Waring et al., 2016, Rosel et al., 2021). However, recent work by Soldevilla et al. (2022a) suggests the range may be broader than previously thought (see EIA **Section C.3.2**).

In several recent acoustic studies in the Gulf of Mexico (Soldevilla et al., 2022a,b; 2024), all Bryde’s whale complex individuals are assumed to be Rice’s whales. However, Bryde’s whales have a global tropical and sub-tropical range that can include the Gulf of Mexico. Moreover, in the latest NMFS Rice’s whale Marine Mammal Stock Assessment Report (Hayes et al., 2023), all previous data of Gulf of Mexico Bryde’s whales from studies that pre-dated the Rosel et al.

(2021) study that determined that Rice’s whales are a distinct species were now assumed to all be Rice’s whales. However, it is unclear on what percentage of Bryde’s whale complex individuals that live or previously lived in Gulf of Mexico are Rice’s whales vs Bryde’s whales due to having no DNA studies that analyzed a representative population of Gulf of Mexico Bryde’s whale complex individuals.

The giant manta ray could occur in the project area but is most commonly observed in the Gulf of Mexico at the Flower Garden Banks. The Nassau grouper (*Epinephelus striatus*) has been observed in the Gulf of Mexico at the Flower Garden Banks but is most commonly observed in shallow tropical reefs of the Caribbean and is not expected to occur in the project area. The smalltooth sawfish is a coastal species limited to shallow areas off the west coast of Florida and is not expected to occur in the project area. The Panama City crayfish (*Procambarus econfinae*) is a coastal species in south-central Bay County, Florida and is not expected to occur in the project area.

Seven Threatened coral species are known from the northern Gulf of Mexico: elkhorn coral (*Acropora palmata*), staghorn coral (*Acropora cervicornis*), lobed star coral (*Orbicella annularis*), mountainous star coral (*Orbicella faveolata*), boulder star coral (*Orbicella franksi*), pillar coral (*Dendrogyra cylindrus*), and rough cactus coral (*Mycetophyllia ferox*). These corals are shallow water, zooxanthellate species (containing symbiotic photosynthetic zooxanthellae which contribute to their nutritional needs) and so are not present in the deepwater project area (see **Section C.3.18**).

There are no other Threatened or Endangered species in the Gulf of Mexico that are likely to be adversely affected by either routine or accidental events. The IPFs with potential impacts listed in **Table 2** are discussed below.

## 5.5 Archaeological Report

The proposed surface hole location lies in Green Canyon Area Block 584. Oceaneering International, Inc. (OII) collected high-resolution geophysical data over the Far South Area of Interest (AOI) in 2023. All data were examined to locate potential submerged archaeological resources within the Area of Potential Effect in the AUV survey area.

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Based on this dataset, the Area of Potential Effect appears clear of submerged archaeological resources. These findings are included in the OII report “Archaeological and Geohazard Assessment, Blocks 540 (OCS-G-37531) and 584 (OCS-G-36297), Green Canyon Area, Gulf of Mexico, OII Report No. 227580-OII-RPT-AAG-01.” If any wood, ceramics, textiles, or ferrous objects become exposed during bottom disturbing operations, all activities must be halted and BOEM notified within 48 hours.

## 6 Waste and Discharge Information

### 6.1 Projected Generated Wastes

A table providing information on the projected solid and liquid wastes likely to be generated by the proposed activities is included in **Appendix D**.

### 6.2 Projected Ocean Discharges

A table providing information on the projected ocean discharges likely to be generated during the proposed activities is included in **Appendix D**.

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## 7 Air Emissions Information

### 7.1 Screening Questions

Screening Questions for EP's	Yes	No
Is any calculated Complex Total (CT) Emission amount (tons) associated with your proposed exploration activities more than 90% of the amounts calculated using the following formulas: $CT = 3400D^{2/3}$ for CO, and $CT = 33.3D$ for the other air pollutants (where D = distance to shore in miles)?		X
Do your emission calculations include any emission reduction measures or modified emission factors?	X	
Are your proposed exploration activities located east of 87.5° W longitude?		X
Do you expect to encounter H <sub>2</sub> S at concentrations greater than 20 parts per million (ppm)?		X
Do you propose to flare or vent natural gas for more than 48 continuous hours, from any proposed well?		X
Do you propose to burn produced hydrocarbon liquids?		X

### 7.2 Emissions Worksheet

An emission workbook (BOEM Form 0138) showing Plan total emissions associated with the activities proposed in this Exploration Plan document is included in **Appendix E**. Total Plan emissions are summarized in the Table below. The proposed Total plan emissions are less than BOEM's emission exemption thresholds and as a result, no further review or controls are required.

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL				
BP Exploration & Production Inc.	Green Canyon	GC 584	OCS-G36297	Not Applicable	GC584-1 "A", "B", "C", "D"				
Year	Facility Emitted Substance								
	TSP	PM10	PM2.5	SO <sub>x</sub>	NO <sub>x</sub>	VOC	Pb	CO	NH <sub>3</sub>
2024	39.02	23.54	22.84	0.57	934.94	26.88	0.00	146.64	0.27
2025	78.04	47.09	45.67	1.14	1869.84	53.76	0.01	293.28	0.55
Allowable	3896.10			3896.10	3896.10	3896.10		81333.51	

### 7.3 Emission Reduction Measures

Emission Source	Reduction Control Method	Amount of NO <sub>x</sub> Reduction (tons/year)*	Monitoring System
BlackHornet MODU engines	Actual Fuel Usage	1,956 tpy	MODU Fuel Usage Logs

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## 7.4 Verification of Non-Default Emission Factors

The project BOEM 0138 Form emissions worksheet tabs (EMISSIONS1, EMISSIONS2) include actual fuel usage rates for MODU BlackHornet. A history of BlackHornet’s actual fuel usage is provided in Attachment 3.

## 7.5 Distance to Shore for Emission Exemption Thresholds (EET)

The distance to shore in statute miles is based on the same coordinate system used in the lease sale documents for the lease.

## 7.6 Non-Exempt Facilities

The calculated maximum projected emissions of the facility, with emissions reduction measures, is less than the respective EET calculated at 30 CFR § 550.303(d). The facility is therefore exempt from the requirements in 30 CFR § 550.303(e) through (i).

## 7.7 Hydrogen Sulfide

The requirements related to hydrogen sulfide (H<sub>2</sub>S) are not repeated here as they are addressed in section 4 of the Plan.

## 7.8 Environmental Impact Analysis (EIA)

The requirements related to EIA are not repeated here as they are addressed in section 15 Appendix I of this Plan.

# 8 Oil Spill Information

## 8.1 Oil Spill Response Planning

### 8.1.1 Regional OSRP Information

All proposed activities and facilities in this EP will be covered by the GoM Regional OSRP filed by BP America Inc. (Operator No. 21372) under cover letter dated October 7, 2022, on behalf of several companies listed in the plan including BP Exploration & Production Inc. (Operator No. 02481). The OSRP was confirmed in compliance and approved by BSEE on November 29, 2022.

Pursuant to 30 CFR 254.30(b), on July 12, 2022, BP submitted to BSEE a revision to the Oil Spill Response Plan referenced above. Revision changes are listed in the Record of Revision Form (Figure 2-1) of the revised OSRP.

BP has adopted additional performance standards:

- a. Provisions to maintain access to a supply of dispersant and fire boom for use in the event of an uncontrolled long-term blowout for the length of time required to drill a relief well;
- b. Contingencies for maintaining an ongoing response for the length of time required to drill a relief well;

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- c. Description of measures and equipment necessary to maximize the effectiveness and efficiency of the response equipment used to recover the discharge on the water's surface, including methods to increase encounter rates;
- d. Information regarding remote sensing technology and equipment to be used to track oil slicks, including oil spill detection systems and remote thickness detection systems (e.g., X-band/infrared systems);
- e. Information regarding the use of communication systems between response vessels and spotter personnel;
- f. Shoreline protection strategy that is consistent with applicable area contingency plans; and
- g. For operations using a subsea BOP or a surface BOP on a floating facility, a discussion regarding strategies and plans related to source abatement and control for blowouts from drilling.

**8.1.2 Spill Response Sites**

Primary Response Equipment Location	Preplanned Staging Location(s)
Tampa, FL; Pascagoula, MS; Houma, LA.; Leeville, LA; Morgan City, LA; Lake Charles, LA.; Venice, LA; Galveston, TX; Ingleside, TX.	Fourchon, LA.

**8.1.3 OSRO Information**

BP is a member of the Marine Spill Response Corporation (MSRC) and Clean Gulf Associates (CGA) and would utilize said Oil Spill Response Organization (OSRO) personnel and equipment in the event of an oil spill at Green Canyon Area Block 584.

**8.1.4 Worst-Case Scenario Determination**

Category	Regional OSRP Approved Nov. 29, 2022	EP
Type of Activity	Drilling >10 miles	Drilling > 10 miles
Facility Location	MC 778	GC 584 (SL)
Facility Designation	Thunder Horse Well 778-15	Well GC 584 Loc "C"
Distance to Nearest Shoreline	68-miles	117 statute miles
Volume storage tanks and flowline (total)	50,000-bbbls	0-bbbls
Volume Lease term pipelines	13,000-bbbls	0-bbbls
Volume Uncontrolled Blowout (Day 1)	360,000-bbbls	180,000-bbbls
Total Volume	423,000-bbbls	180,000-bbbls
Type of Oil(s) – (Crude Oil, Condensate, Diesel)	Crude	Crude
API Gravity(s)	32.0	25.6°

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BP has determined the worst case discharge scenario from the activities proposed in this EP do not supersede the worst-case scenario in BPXP’s GoM Regional OSRP filed by BP America Inc. (Operator No. 21372) under cover letter dated October 7, 2022 on behalf of several companies listed in the plan including BP Exploration & Production Inc. (Operator No. 02481). The OSRP was confirmed in compliance and approved by BSEE on November 29, 2022. Pursuant to NTL No. 2008-G04, BP makes the following statement:

Since BP Exploration & Production Inc. has the capability to respond to the worst-case spill scenario included in its regional Oil Spill Response Plan approved on November 29, 2022, and since the worst-case scenario determined for our EP does not replace the worst-case scenario in our regional or sub-regional OSRP, BP certifies that it has the capability to respond, to the maximum extent practicable, to a worst-case discharge, or a substantial threat of such a discharge, resulting from the activities proposed in our EP.

Wellbore data, geologic data, reservoir data, and fluid data used in modeling and making the WCD determination are provided in **Appendix F** in the Proprietary Information copies of this Exploration Plan.

## 8.2 Oil Spill Response Discussion

A detailed discussion of a response to an oil spill is included in **Appendix G**. This Appendix addresses topics such as resource identification, release modeling, response technologies, and source containment / control.

## 9 Environmental Monitoring and Mitigation Measures

### 9.1 Monitoring Systems

In addition to rig control engineered systems, operational personnel have been instructed to check for pollution frequently during their tour of duty and, if pollution is spotted, to identify and shut-off the source and make immediate notifications as per instructions provided in Section 8 of BP’s certified OSRP. In accordance with the measures described in Appendices A, B, C and J of the NMFS 2020 Biological Opinion, as amended on April 26, 2021 [*Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico*. Office of Protected Resources, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce (March 13, 2020, amended April 26, 2021)], a person onboard the vessel(s) will visually monitor the moonpool(s) using a remote camera system. Logs will be kept for each shift documenting the observed presence/absence of marine animals in the moonpool(s). If a protected species is observed in the moonpool(s), required reporting to the appropriate agencies will be made and BP will comply with ensuing guidance.

Also, in accordance with the provisions of Title 30 CFR § 250.713(g) and NTL 2018-G01 “Ocean Current Monitoring” dated August 7, 2018, the MODU will be equipped with an Acoustic Doppler Current Profile (ADCP) current monitoring system onboard to allow continuous monitoring and gathering of ocean current data on a real-time basis in the upper 1000 meters.

### 9.2 Incidental Takes

Mitigation measures described in Appendices A, B, C and J of the NMFS 2020 Biological Opinion, as amended in 2021, will be implemented to the extent they are applicable to the activities outlined in this plan. Monitoring activities are conducted by personnel on vessels to prevent accidental loss of materials overboard, and to report sightings of injured/dead protected species. Reporting of dead/injured protected species is addressed in Annex 2 of BP’s

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“Incident Notification and Investigation Procedure - Attachment 1”. Additionally, to mitigate against incidental takes, activities will be conducted in adherence to 2020 revisions of BSEE NTL 2015-G03 “Marine Trash and Debris Awareness Training and Elimination”; BOEM NTL 2016-G01 “Vessel Strike Avoidance and Injured/Dead Protected Species Reporting” and BOEM NTL 2016-G02 “Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program”, as necessary. As required by BSEE NTL 2015-G03, BP submits an annual certification letter for its Marine Debris Awareness Training Process. The marine debris awareness training is required annually by the BSEE and is identified by “BP’s Gulf of Mexico (GoM) Environmental Training Matrix” and “BP’s GoM Health, Safety, and Environmental (HSE) Training Needs Assessment”, both of which are located on BP’s GoM HSE website.

Further mitigation measures can be found throughout the supporting EIA found in **Appendix I**.

### 9.3 Flower Garden Banks National Marine Sanctuary

All proposed activities will occur outside of the Protective Zones of the Flower Garden Banks National Marine Sanctuary boundaries.

## 10 Lease Stipulations

Oil and gas exploration activities on the OCS are sometimes subject to mitigations in the form of lease stipulations.

### 10.1 Lease Stipulation Information

#### Lease Stipulation for Protected Species

Mitigation measures described in Appendices A, B, C and J of the NMFS 2020 Biological Opinion, as amended in 2021, will be implemented to the extent they are applicable to the activities outlined in this plan. Additionally, all activities will be conducted in adherence to 2020 revisions of NTL 2015-G03 “Marine Trash and Debris Awareness Training and Elimination”; BOEM NTL 2016-G01 “Vessel Strike Avoidance and Injured/Dead Protected Species Reporting” and BOEM NTL 2016-G02 “Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program”, as necessary. Mitigation to prevent takes varies based on the activity underway and it can include worker training on waste management and trash and debris containment procedures to avoid accidental loss overboard and its potential impact on protected species, and training on reporting of dead/injured protected species addressed in BP’s Incident Notification and Investigation Procedure.

## 11 Related Facilities and Operations Information

### 11.1 Produced Liquid Hydrocarbons Transportation Vessels

There are no well tests proposed in this Exploration Plan.

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## 12 Support Vessels and Aircraft Information

### 12.1 General

Type	Maximum Fuel Tank Storage Capacity	Maximum No. in Area at Any Time	Trip Frequency or Duration
Helicopter	713-gals	1	4 / week
Crew Boats	1,000-bbls	1	2 / week
Supply Boats	5,000-bbls	1	2 / week

### 12.2 Diesel Oil Supply Vessels

Size of Fuel Supply Vessel	Capacity of Fuel Supply Vessel	Frequency of Fuel Transfers	Route Fuel Supply Vessel will Take
240-feet to 312-feet	50,000-gallons (boat fuel)	Weekly / as needed	From the shorebase in Fourchon, LA, to Green Canyon Area Block 584

### 12.3 Solid and Liquid Wastes Transportation & Disposal

A table providing information on the transportation of solid and liquid wastes and the onshore facilities used for disposal of solid and liquid wastes generated by the proposed activities is included in Table 2 found in **Appendix D**.

### 12.4 Vicinity Map

A vicinity map depicting the location of the proposed activities relative to the shoreline, the distance of the proposed activities from the shoreline, and the primary route(s) of the support vessels and aircraft when traveling between the onshore support facilities and the project areas is included in **Appendix B**. In accordance with Appendices A, B, C, and J of the NMFS 2020 Biological Opinion, as amended in 2021, transit routes will avoid the Rice's whale core distribution area. As outlined in the table below, vessels will transit from shorebases in Louisiana to the blocks where activities will occur under this plan.

## 13 Onshore Support Facilities Information

### 13.1 General

The onshore support base for the proposed operations will be in Fourchon, Louisiana. Green Canyon Area Block 584 is located approximately 138 statute miles from the onshore support base located in Fourchon, Louisiana, as indicated on the vicinity map in **Appendix B**.

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The following table provides information of the onshore facility that will be used to provide supply and service support for the activities proposed in this plan.

Name	Location	Existing / New / Modified
C-Port	Fourchon, LA	Existing
Heliport	Houma, LA	Existing

BP will primarily use the existing C-Port Fourchon Shorebase located in Fourchon, Lafourche Parish, Louisiana to support general vessel operations. No expansion of these physical facilities is expected to result from the proposed activities. The C-Port Fourchon facility is located approximately 138 miles from the general activity area, provides a vehicle parking lot, office space, radio communication equipment, outside and warehouse storage space, crane, forklifts, water and fueling facilities, and boat dock space. The base is in operation 24 hours each day. Helicopters will be based out of Houma, Louisiana.

A small amount of vessel and helicopter traffic may originate from bases other than those described above in order to address changes in weather conditions. It is expected that this vessel traffic will originate from bases and locations that are in the near vicinity of the bases previously described.

### 13.2 Support Base Construction or Expansion

BP will utilize existing support bases for the proposed activities and will not require the construction or expansion of additional support bases.

### 13.3 Waste Disposal

Information about the onshore facilities used to store and dispose of solid and liquid wastes generated by proposed activities has been included in Table 2 found in **Appendix D**.

## 14 Coastal Zone Management Act (CZMA) Information

### 14.1 Consistency Certification

A Coastal Zone Management Act consistency certification, according to 15 CFR § 930.76(b) is included in **Appendix H**.

### 14.2 New or Unusual Technology

See Sections 2.7.5, 2.7.8, 8.1.1, and 8.1.3 within the EP for a discussion of voluntary performance standards and Oil Spill Response Organization (OSRO) participation. No new or unusual technology for spill prevention, control, or cleanup is proposed. The EP Section 2.7 Blowout Scenario describes prevention, control, and cleanup technologies that are currently available.

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## 15 Environmental Impact Analysis (EIA)

Attached as **Appendix I** is an Environmental Impact Analysis (EIA) prepared for the proposed project by CSA Ocean Sciences Inc. 8502 Sw Kansas Ave, Stuart, FL 34997.

Mitigation measures described in Appendices A, B, C and J of the NMFS 2020 Biological Opinion, as amended in 2021, will be implemented to the extent they are applicable to the activities outlined in this plan. Additionally, BOEM (or its predecessor, the Minerals Management Service) has conducted extensive environmental analyses examining the possible impacts produced by oil and gas exploration and production activities, which evaluated impacts from similar activities on the areas in the Gulf of Mexico covered by the present plan.

The EIA addresses potential impacts to environmental resources found in the deepwater Gulf of Mexico (GoM), coastal habitats, protected areas, and onshore. Based on the activity set of the project, these included:

- Drilling rig presence, physical disturbance to the seafloor, air emissions, effluent discharges, water intake, onshore waste disposal, marine debris, support vessel/helicopter traffic, and unintended releases to the marine environment.

The EIA outlines high level mitigation measures that will be in place to reduce associated potential impacts.

## 16 Administrative Information

### 16.1 Exempted Information Description

In accordance with 43 CFR Part 2, Appendix E, sections (4) and (9), the following information has been determined by the BOEM GOMR exempt from public disclosure:

- Geologic Objectives (BHL, TVD and MD) on Form BOEM-0137
- Production rates and life of reservoirs
- Proprietary New or Unusual Technology
- Geological and Geophysical Information (except for non-proprietary Shallow Hazard Assessment)
- Hydrogen Sulfide Correlative Well Information

This information is excluded from the “Public Information” copies of the submitted plan.

### 16.2 Bibliography

Any previously submitted EP, DPP, DOCD, study report, survey report, or any other material referenced in this EP are listed below:

Plan Control No	Lease	Block	Operator Name	Operator Number	Plan Type Code	Received Date	Final Action Code	Final Action Date

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### 16.3 Other Reference Items

*Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico. Office of Protected Resources, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce (March 13, 2020, amended April 24, 2021)*

*Deepwater Horizon Containment and Response: Harnessing Capabilities and Lessons Learned.*

Oceaneering International, Inc., 2024, "Wellsite Clearance Report, Proposed Well GC584-A, Block 584, Green Canyon Gulf of Mexico, OII Report No. 227580-OII-RPT-WCL-01-R0."

Oceaneering International, Inc., 2024, "Wellsite Clearance Report, Proposed Well GC584-C, Block 584, Green Canyon Gulf of Mexico, OII Report No. 227580-OII-RPT-WCL-02-R0."

Oceaneering International, Inc., 2024, "Archaeological and Geohazard Assessment, Blocks 540 (OCS-G-37531) and 584 (OCS-G-36297), Green Canyon Area, Gulf of Mexico", OII Report No. 227580-OII-RPT-AAG-01."

Environmental Impact Analysis for a Supplemental Exploration Plan for Green Canyon Block 584, CSA Ocean Sciences Inc. June 2024

Coastal Zone Management Consistency Certification State of Louisiana for Green Canyon Block 584, CSA Ocean Sciences Inc. June 2024

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## 17 Appendixes

Appendix A:	Plan Information Forms – Form BOEM-0137
Appendix B:	Location Plat, Bathymetry Plat, and Vicinity Plat
Appendix C:	Geological & Geophysical Information (Geological Description, Structure Contour Maps, Interpreted Seismic Lines, Geological Structure Cross-Section Maps, Shallow Hazards Assessments (Site Clearance Letters), Stratigraphic Column, Hydrogen Sulfide Basis of Requested Classification, Time vs. Depth Information
Appendix D:	Wastes and Discharges Tables (Projected Generated Wastes and Projected Ocean Discharges)
Appendix E:	Air Emissions Information – Form BOEM-0138
Appendix F:	WCD Modeling Report
Appendix G:	Oil Spill Response Discussion
Appendix H:	Coastal Zone Management Act (CZMA) Consistency Certification
Appendix I:	Environmental Impact Analysis (EIA)
Appendix J:	New Technology
Appendix K:	Fees Recovery

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**Appendix A: Plan Information Forms – Form BOEM-0137**

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**OCS PLAN INFORMATION FORM (CONTINUED)**  
**Include one copy of this page for each proposed well/structure**

Proposed Well/Structure Location										
Well or Structure Name/Number (If renaming well or structure, reference previous name): GC584 Loc. A ST00				Previously reviewed under an approved EP or DOCD?			Yes	X	No	
Is this an existing well or structure?		Yes	X	No	If this is an existing well or structure, list the Complex ID or API No.					
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?						X	Yes		No	
<b>WCD Info</b>	For wells, volume of uncontrolled blowout (Bbls/Day): 180,000			For structures, volume of all storage and pipelines (Bbls):			API Gravity of fluid		25.6°	
	<b>Surface Location</b>			<b>Bottom-Hole Location (For Wells)</b>			<b>Completion (For multiple completions, enter separate lines)</b>			
<b>Lease No.</b>	OCS-G 36297			OCS-G			OCS OCS			
<b>Area Name</b>	Green Canyon									
<b>Block No.</b>	584									
<b>Blockline Departures (in feet)</b>	N/S Departure: 2,575.00 FNL			N/S Departure:			N/S Departure		F __ L	
	E/W Departure: 7,790.00 FEL			E/W Departure:			N/S Departure		F __ L	
<b>Lambert X-Y coordinates</b>	X: 2,178,130.00			X:			X:		F __ L	
	Y: 9,944,945.00			Y:			Y:		F __ L	
<b>Latitude/ Longitude</b>	Latitude: 27° 23' 45.798"N NAD27			Latitude:			Latitude		F __ L	
	Longitude: 91° 20' 32.641"W NAD27			Longitude:			E/W Departure		F __ L	
Water Depth (Feet): 4,092				MD (Feet):		TVD (Feet):		MD (Feet):		TVD (Feet):
Anchor Radius (if applicable) in feet:								MD (Feet):		TVD (Feet):
<b>Anchor Locations for Drilling Rig or Construction Barge (If anchor radius supplied above, not necessary)</b>										
<b>Anchor Name or No.</b>	<b>Area</b>	<b>Block</b>	<b>X Coordinate</b>		<b>Y Coordinate</b>		<b>Length of Anchor Chain on Seafloor</b>			
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					

**OCS PLAN INFORMATION FORM (CONTINUED)**  
**Include one copy of this page for each proposed well/structure**

Proposed Well/Structure Location										
Well or Structure Name/Number (If renaming well or structure, reference previous name): GC584 Loc. B ST00				Previously reviewed under an approved EP or DOCD?			Yes	X	No	
Is this an existing well or structure?		Yes	X	No	If this is an existing well or structure, list the Complex ID or API No.					
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?						X	Yes		No	
<b>WCD Info</b>	For wells, volume of uncontrolled blowout (Bbls/Day): 180,000			For structures, volume of all storage and pipelines (Bbls):			API Gravity of fluid		25.6°	
	<b>Surface Location</b>			<b>Bottom-Hole Location (For Wells)</b>			<b>Completion (For multiple completions, enter separate lines)</b>			
<b>Lease No.</b>	OCS-G 36297			OCS-G			OCS OCS			
<b>Area Name</b>	Green Canyon									
<b>Block No.</b>	584									
<b>Blockline Departures (in feet)</b>	N/S Departure: 2,483.69 FNL			N/S Departure:			N/S Departure		F __ L	
	E/W Departure: 7,671.75 FEL			E/W Departure:			N/S Departure		F __ L	
<b>Lambert X-Y coordinates</b>	X: 2,178,248.25			X:			X:		F __ L	
	Y: 9,945,036.31			Y:			X:		F __ L	
<b>Latitude/ Longitude</b>	Latitude: 27° 23' 46.687"N NAD27			Latitude:			Y:		F __ L	
	Longitude: 91° 20' 31.315"W NAD27			Longitude:			Y:		F __ L	
Water Depth (Feet): 4,098				MD (Feet):		TVD (Feet):		MD (Feet):		TVD (Feet):
Anchor Radius (if applicable) in feet:								MD (Feet):		TVD (Feet):
								MD (Feet):		TVD (Feet):
Anchor Locations for Drilling Rig or Construction Barge (If anchor radius supplied above, not necessary)										
Anchor Name or No.	Area	Block	X Coordinate		Y Coordinate		Length of Anchor Chain on Seafloor			
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					

**OCS PLAN INFORMATION FORM (CONTINUED)**  
**Include one copy of this page for each proposed well/structure**

Proposed Well/Structure Location										
Well or Structure Name/Number (If renaming well or structure, reference previous name): GC584 Loc. C ST00				Previously reviewed under an approved EP or DOCD?			Yes	X	No	
Is this an existing well or structure?		Yes	X	No	If this is an existing well or structure, list the Complex ID or API No.					
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?						X	Yes		No	
<b>WCD Info</b>	For wells, volume of uncontrolled blowout (Bbls/Day): 180,000			For structures, volume of all storage and pipelines (Bbls):			API Gravity of fluid		25.6°	
	<b>Surface Location</b>			<b>Bottom-Hole Location (For Wells)</b>			<b>Completion (For multiple completions, enter separate lines)</b>			
<b>Lease No.</b>	OCS-G 36297			OCS-G			OCS OCS			
<b>Area Name</b>	Green Canyon									
<b>Block No.</b>	584									
<b>Blockline Departures (in feet)</b>	N/S Departure: 1,075.00 FNL			N/S Departure:			N/S Departure		F __ L	
	E/W Departure: 7,520.00 FEL			E/W Departure:			N/S Departure		F __ L	
<b>Lambert X-Y coordinates</b>	X: 2,178,400.00			X:			X:		X:	
	Y: 9,946,445.00			Y:			Y:		Y:	
<b>Latitude/ Longitude</b>	Latitude: 27° 24' 00.617"N NAD27			Latitude:			Latitude		Latitude	
	Longitude: 91° 20' 29.424"W NAD27			Longitude:			Longitude		Longitude	
Water Depth (Feet): 4,116				MD (Feet):		TVD (Feet):		MD (Feet):		TVD (Feet):
Anchor Radius (if applicable) in feet:								MD (Feet):		TVD (Feet):
								MD (Feet):		TVD (Feet):
Anchor Locations for Drilling Rig or Construction Barge (If anchor radius supplied above, not necessary)										
Anchor Name or No.	Area	Block	X Coordinate		Y Coordinate		Length of Anchor Chain on Seafloor			
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					
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			X:		Y:					

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Proposed Well/Structure Location										
Well or Structure Name/Number (If renaming well or structure, reference previous name): GC584 Loc. D ST00				Previously reviewed under an approved EP or DOCD?			Yes	X	No	
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<b>WCD Info</b>	For wells, volume of uncontrolled blowout (Bbls/Day): 180,000			For structures, volume of all storage and pipelines (Bbls):			API Gravity of fluid		25.6°	
	<b>Surface Location</b>			<b>Bottom-Hole Location (For Wells)</b>			<b>Completion (For multiple completions, enter separate lines)</b>			
<b>Lease No.</b>	OCS-G 36297			OCS-G			OCS OCS			
<b>Area Name</b>	Green Canyon									
<b>Block No.</b>	584									
<b>Blockline Departures (in feet)</b>	N/S Departure: 983.69 FNL			N/S Departure:			N/S Departure		F __ L	
	E/W Departure: 7,401.75 FEL			E/W Departure:			N/S Departure		F __ L	
<b>Lambert X-Y coordinates</b>	X: 2,178,518.25			X:			X:		F __ L	
	Y: 9,946,536.31			Y:			X:		F __ L	
<b>Latitude/ Longitude</b>	Latitude: 27° 24' 01.505"N NAD27			Latitude:			Y:		F __ L	
	Longitude: 91° 20' 28.098"W NAD27			Longitude:			Y:		F __ L	
Water Depth (Feet): 4,126				MD (Feet):		TVD (Feet):		MD (Feet):		TVD (Feet):
Anchor Radius (if applicable) in feet:								MD (Feet):		TVD (Feet):
								MD (Feet):		TVD (Feet):
<b>Anchor Locations for Drilling Rig or Construction Barge (If anchor radius supplied above, not necessary)</b>										
<b>Anchor Name or No.</b>	<b>Area</b>	<b>Block</b>	<b>X Coordinate</b>		<b>Y Coordinate</b>		<b>Length of Anchor Chain on Seafloor</b>			
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					

**OCS PLAN INFORMATION FORM (CONTINUED)**  
**Include one copy of this page for each proposed well/structure**

Proposed Well/Structure Location										
Well or Structure Name/Number (If renaming well or structure, reference previous name): GC584 Loc. A ST01				Previously reviewed under an approved EP or DOCD?			Yes	X	No	
Is this an existing well or structure?		Yes	X	No	If this is an existing well or structure, list the Complex ID or API No.					
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?						X	Yes		No	
<b>WCD Info</b>	For wells, volume of uncontrolled blowout (Bbls/Day): 180,000			For structures, volume of all storage and pipelines (Bbls):			API Gravity of fluid		32.6°	
	<b>Surface Location</b>			<b>Bottom-Hole Location (For Wells)</b>			<b>Completion (For multiple completions, enter separate lines)</b>			
<b>Lease No.</b>	OCS-G 36297			OCS-G			OCS OCS			
<b>Area Name</b>	Green Canyon									
<b>Block No.</b>	584									
<b>Blockline Departures (in feet)</b>	N/S Departure: 2,575.00 FNL			N/S Departure:			N/S Departure		F __ L	
	E/W Departure: 7,790.00 FEL			E/W Departure:			E/W Departure		F __ L	
<b>Lambert X-Y coordinates</b>	X: 2,178,130.00			X:			X:		X:	
	Y: 9,944,945.00			Y:			Y:		Y:	
<b>Latitude/ Longitude</b>	Latitude: 27° 23' 45.798"N NAD27			Latitude:			Latitude		Latitude	
	Longitude: 91° 20' 32.641"W NAD27			Longitude:			Longitude		Longitude	
Water Depth (Feet): 4,092				MD (Feet):		TVD (Feet):		MD (Feet):		TVD (Feet):
Anchor Radius (if applicable) in feet:								MD (Feet):		TVD (Feet):
<b>Anchor Locations for Drilling Rig or Construction Barge (If anchor radius supplied above, not necessary)</b>										
<b>Anchor Name or No.</b>	<b>Area</b>	<b>Block</b>	<b>X Coordinate</b>		<b>Y Coordinate</b>		<b>Length of Anchor Chain on Seafloor</b>			
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					

**OCS PLAN INFORMATION FORM (CONTINUED)**  
**Include one copy of this page for each proposed well/structure**

Proposed Well/Structure Location										
Well or Structure Name/Number (If renaming well or structure, reference previous name): GC584 Loc. B ST01				Previously reviewed under an approved EP or DOCD?			Yes	X	No	
Is this an existing well or structure?		Yes	X	No	If this is an existing well or structure, list the Complex ID or API No.					
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?						X	Yes		No	
<b>WCD Info</b>	For wells, volume of uncontrolled blowout (Bbls/Day): 180,000			For structures, volume of all storage and pipelines (Bbls):			API Gravity of fluid		32.6°	
	<b>Surface Location</b>			<b>Bottom-Hole Location (For Wells)</b>			<b>Completion (For multiple completions, enter separate lines)</b>			
<b>Lease No.</b>	OCS-G 36297			OCS-G			OCS OCS			
<b>Area Name</b>	Green Canyon									
<b>Block No.</b>	584									
<b>Blockline Departures (in feet)</b>	N/S Departure: 2,483.69 FNL			N/S Departure:			N/S Departure		F __ L	
	E/W Departure: 7,671.75 FEL			E/W Departure:			N/S Departure		F __ L	
<b>Lambert X-Y coordinates</b>	X: 2,178,248.25			X:			X:		F __ L	
	Y: 9,945,036.31			Y:			X:		F __ L	
<b>Latitude/ Longitude</b>	Latitude: 27° 23' 46.687"N NAD27			Latitude:			Y:		F __ L	
	Longitude: 91° 20' 31.315"W NAD27			Longitude:			Y:		F __ L	
Water Depth (Feet): 4,098				MD (Feet):		TVD (Feet):		MD (Feet):		TVD (Feet):
Anchor Radius (if applicable) in feet:								MD (Feet):		TVD (Feet):
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Anchor Name or No.	Area	Block	X Coordinate		Y Coordinate		Length of Anchor Chain on Seafloor			
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					

**OCS PLAN INFORMATION FORM (CONTINUED)**  
**Include one copy of this page for each proposed well/structure**

Proposed Well/Structure Location										
Well or Structure Name/Number (If renaming well or structure, reference previous name): GC584 Loc. C ST01				Previously reviewed under an approved EP or DOCD?			Yes	X	No	
Is this an existing well or structure?		Yes	X	No	If this is an existing well or structure, list the Complex ID or API No.					
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	<b>Surface Location</b>			<b>Bottom-Hole Location (For Wells)</b>			<b>Completion (For multiple completions, enter separate lines)</b>			
<b>Lease No.</b>	OCS-G 36297			OCS-G			OCS OCS			
<b>Area Name</b>	Green Canyon									
<b>Block No.</b>	584									
<b>Blockline Departures (in feet)</b>	N/S Departure: 1,075.00 FNL			N/S Departure:			N/S Departure		F _ L	
	E/W Departure: 7,520.00 FEL			E/W Departure:			N/S Departure		F _ L	
<b>Lambert X-Y coordinates</b>	X: 2,178,400.00			X:			X:		X:	
	Y: 9,946,445.00			Y:			Y:		Y:	
<b>Latitude/ Longitude</b>	Latitude: 27° 24' 00.617"N NAD27			Latitude:			Latitude		Latitude	
	Longitude: 91° 20' 29.424"W NAD27			Longitude:			Longitude		Longitude	
Water Depth (Feet): 4,116				MD (Feet):		TVD (Feet):		MD (Feet):		TVD (Feet):
Anchor Radius (if applicable) in feet:								MD (Feet):		TVD (Feet):
								MD (Feet):		TVD (Feet):
Anchor Locations for Drilling Rig or Construction Barge (If anchor radius supplied above, not necessary)										
Anchor Name or No.	Area	Block	X Coordinate		Y Coordinate		Length of Anchor Chain on Seafloor			
			X:		Y:					
			X:		Y:					
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			X:		Y:					
			X:		Y:					
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			X:		Y:					

**OCS PLAN INFORMATION FORM (CONTINUED)**  
**Include one copy of this page for each proposed well/structure**

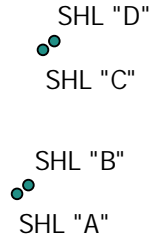
Proposed Well/Structure Location										
Well or Structure Name/Number (If renaming well or structure, reference previous name): GC584 Loc. D ST01				Previously reviewed under an approved EP or DOCD?			Yes	X	No	
Is this an existing well or structure?		Yes	X	No	If this is an existing well or structure, list the Complex ID or API No.					
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<b>WCD Info</b>	For wells, volume of uncontrolled blowout (Bbls/Day): 180,000			For structures, volume of all storage and pipelines (Bbls):			API Gravity of fluid		32.6°	
	<b>Surface Location</b>			<b>Bottom-Hole Location (For Wells)</b>			<b>Completion (For multiple completions, enter separate lines)</b>			
<b>Lease No.</b>	OCS-G 36297			OCS-G			OCS OCS			
<b>Area Name</b>	Green Canyon									
<b>Block No.</b>	584									
<b>Blockline Departures (in feet)</b>	N/S Departure: 983.69 FNL			N/S Departure:			N/S Departure		F __ L	
	E/W Departure: 7,401.75 FEL			E/W Departure:			N/S Departure		F __ L	
<b>Lambert X-Y coordinates</b>	X: 2,178,518.25			X:			X:		F __ L	
	Y: 9,946,536.31			Y:			X:		F __ L	
<b>Latitude/ Longitude</b>	Latitude: 27° 24' 01.505"N NAD27			Latitude:			Y:		F __ L	
	Longitude: 91° 20' 28.098"W NAD27			Longitude:			Y:		F __ L	
Water Depth (Feet): 4,126				MD (Feet):		TVD (Feet):		MD (Feet):		TVD (Feet):
Anchor Radius (if applicable) in feet:								MD (Feet):		TVD (Feet):
<b>Anchor Locations for Drilling Rig or Construction Barge (If anchor radius supplied above, not necessary)</b>										
<b>Anchor Name or No.</b>	<b>Area</b>	<b>Block</b>	<b>X Coordinate</b>		<b>Y Coordinate</b>		<b>Length of Anchor Chain on Seafloor</b>			
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					
			X:		Y:					

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## Appendix B: Location Plat, Bathymetry Plat, and Vicinity Plat

<b>Title of Document:</b>	Initial Exploration Plan – Far South	<b>Document Number:</b>	GM001-DR-PLN-600-00375730
<b>Authority:</b>	Brenda Linster	<b>Revision</b>	0
<b>Custodian/Owner:</b>	Adalberto Garcia	<b>Issue Date:</b>	06/11/2024
<b>Retention Code:</b>	ADM3000	<b>Next Review Date (if applicable):</b>	
<b>Security Classification:</b>		<b>Page:</b>	Page 31 of 40
<b>Warning: Check DW Docs revision to ensure you are using the correct revision.</b>			

Y = 9,947,520.00 ft



Grid North



Grid: BLM Zone 15 North  
Datum: NAD27  
Units: US Survey Feet

X = 2,170,080.00 ft

# GC584

OCS-G 36297  
BP Exp & Prod

X = 2,185,920.00 ft


	Well	BLM Zone 15 North NAD27 - US Survey Feet		GC BLK	Block Ties		NAD27 Lat/Long		NAD83 Lat/Long		Depth
		East ng	Northing		FEL	FNL	Lat tude	Longitude	Lat tude	Longitude	
EP SHL	"A"	2,178,130.00	9,944,945.00	584	7,790.00	2,575.00	27 23 45.798N	91 20 32.641W	27 23 46.771N	91 20 32.907W	4092'
	"B"	2,178,248.25	9,945,036.31	584	7,671.75	2,483.69	27 23 46.687N	91 20 31.315W	27 23 47.660N	91 20 31.581W	4098'
	"C"	2,178,400.00	9,946,445.00	584	7,520.00	1,075.00	27 24 00.617N	91 20 29.424W	27 24 01.590N	91 20 29.690W	4116'
	"D"	2,178,518.25	9,946,536.31	584	7,401.75	983.69	27 24 01.505N	91 20 28.098W	27 24 02.478N	91 20 28.364W	4126'

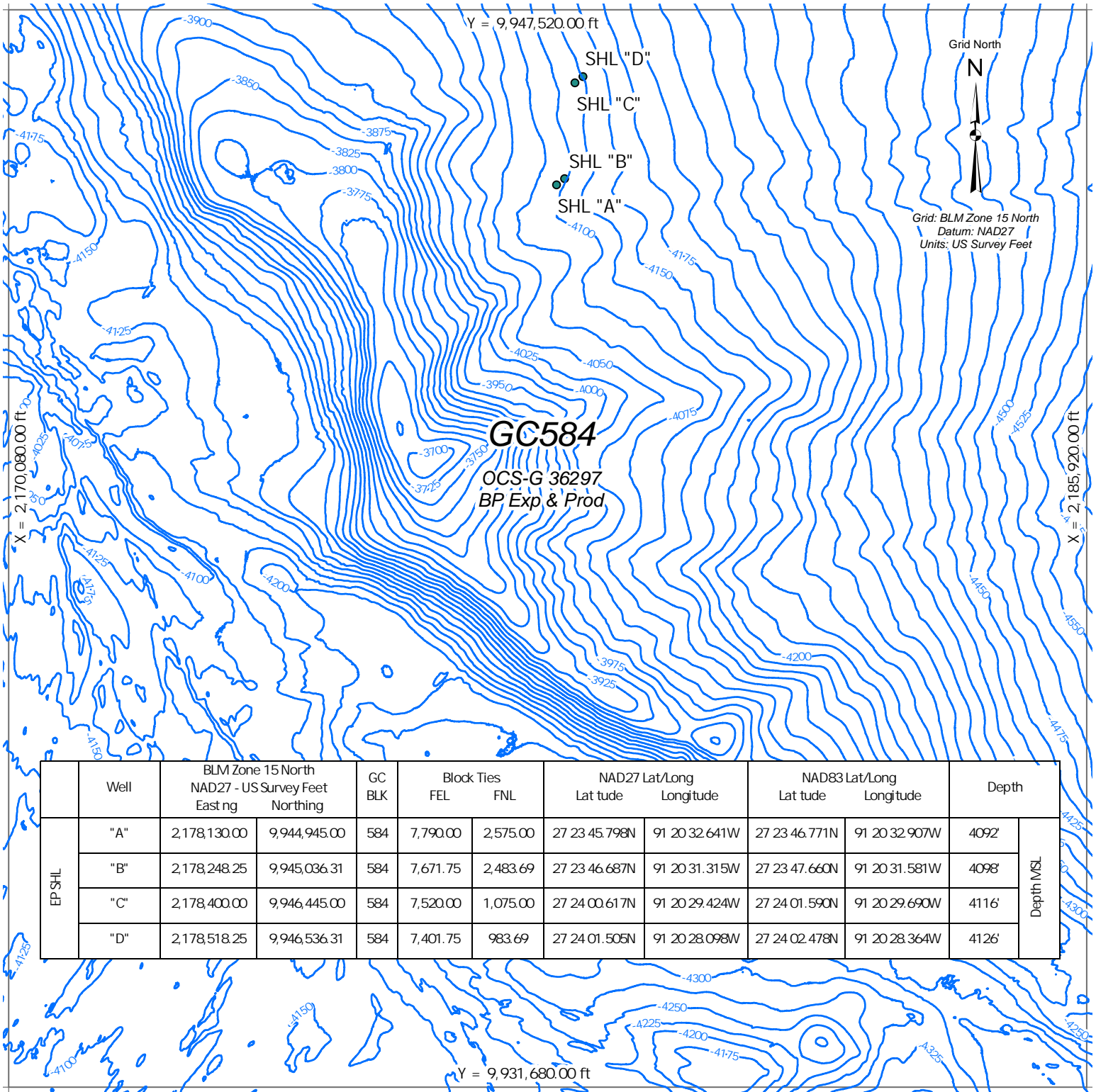
Y = 9,931,680.00 ft

**Notes:**

- 1) All spatial data based on BLM Zone 15 North, NAD27, US Survey Feet, unless otherwise noted;
- 2) All geodetic transformations based on NADCON version 2.0 or better software;
- 3) All well SHL and BHL data based upon BSEE data as of April 2024 and internal BP sources;

*"Public"*

	BP EXPLORATION AND PRODUCTION		Scale 1" = 2000 ft
	Proposed EP Locations OCS-G36297 GC584-1 "A", "B", "C", "D"		Date: 4/16/2024
	Green Canyon Area (OPD# NG15-03) Block 584	Offshore Federal	
	Plat prepared by: Ian Dootson (BP Solutions)		ID




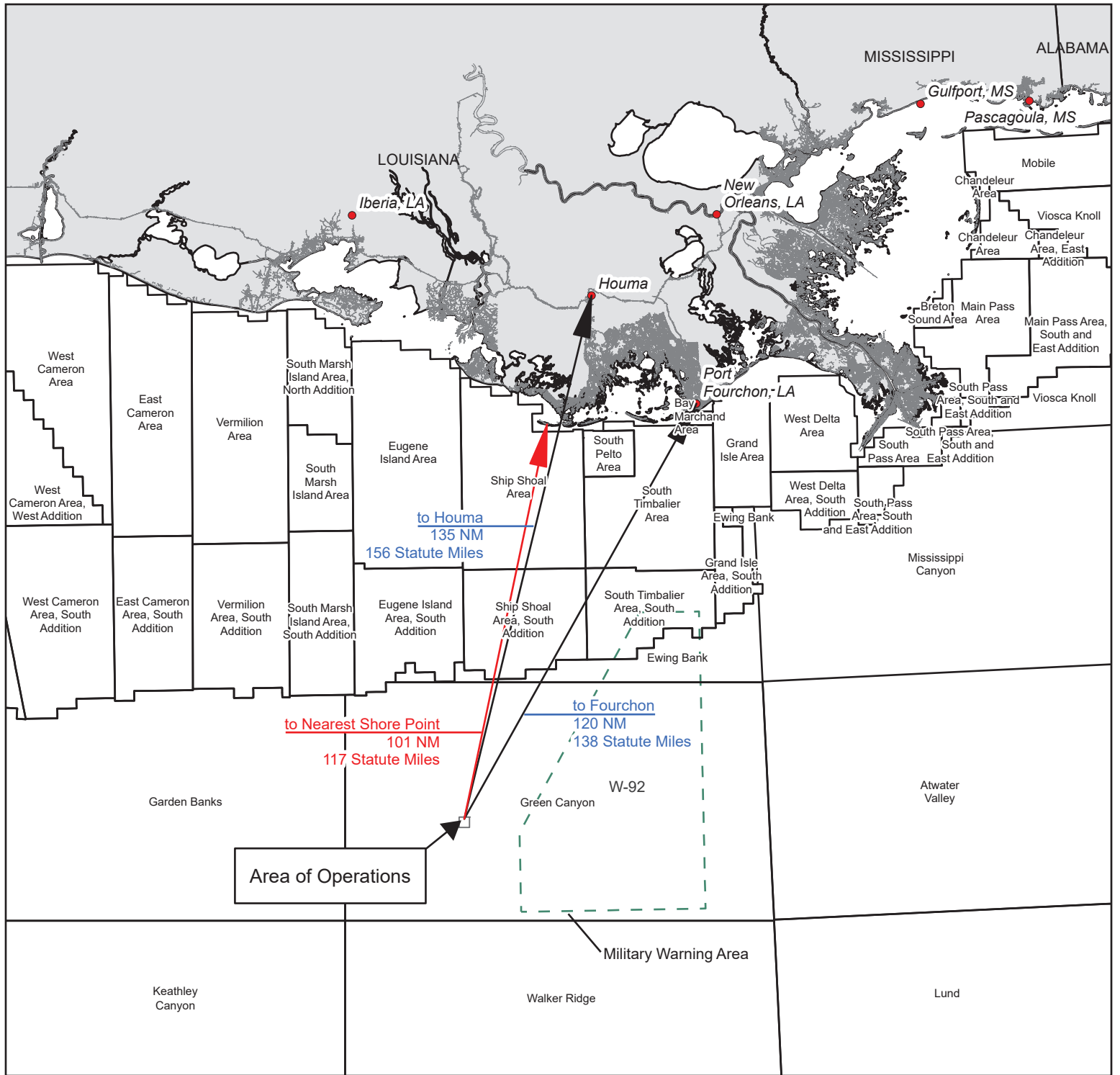
	Well	BLM Zone 15 North NAD27 - US Survey Feet		GC BLK	Block Ties		NAD27 Lat/Long		NAD83 Lat/Long		Depth
		East ng	Northing		FEL	FNL	Lat tude	Longitude	Lat tude	Longitude	
EP SHL	"A"	2,178,130.00	9,944,945.00	584	7,790.00	2,575.00	27 23 45.798N	91 20 32.641W	27 23 46.771N	91 20 32.907W	4092'
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	"D"	2,178,518.25	9,946,536.31	584	7,401.75	983.69	27 24 01.505N	91 20 28.098W	27 24 02.478N	91 20 28.364W	4126'

**Notes:**

- 1) All spatial data based on BLM Zone 15 North, NAD27, US Survey Feet, unless otherwise noted;
- 2) All geodetic transformations based on NADCON version 2.0 or better software;
- 3) All well SHL and BHL data based upon BSEE data as of April 2024 and internal BP sources;

## "Bathymetry"


	BP EXPLORATION AND PRODUCTION	Scale 1" = 2000 ft
	Proposed EP Locations OCS-G36297 GC584-1 "A", "B", "C", "D"	Date: 4/16/2024
	Green Canyon Area (OPD# NG15-03) Block 584	Offshore Federal
	Plat prepared by: Ian Dootson (BP Solutions)	ID



Note: GC584-1 "A" used for distance calculations to the shoreline. The shoreline used is the NOAA 1:24K Continuously Updated Shoreline Product (CUSP).



## "Vicinity Chart"

	BP EXPLORATION AND PRODUCTION	Scale 1" = 40 miles
	Proposed EP Locations OCS-G36297 GC584-1 "A", "B", "C", "D"	
	Green Canyon Area (OPD# NG15-03) Block 584	Offshore Federal
	Plat prepared by: Ian Dootson (BP Solutions)	
		Date: 4/15/2024
		ID

---

**Appendix C: Geological & Geophysical Information (Geological Description, Structure Contour Maps, Interpreted Seismic Lines, Geological Structure Cross-Section Maps, Shallow Hazards Assessments (Site Clearance Letters) for Well Locations, Stratigraphic Column, H<sub>2</sub>S Correlative Wells Information, Time vs. Depth Information**

<b>Title of Document:</b>	Initial Exploration Plan – Far South	<b>Document Number:</b>	GM001-DR-PLN-600-00375730
<b>Authority:</b>	Brenda Linster	<b>Revision</b>	0
<b>Custodian/Owner:</b>	Adalberto Garcia	<b>Issue Date:</b>	06/11/2024
<b>Retention Code:</b>	ADM3000	<b>Next Review Date (if applicable):</b>	
<b>Security Classification:</b>		<b>Page:</b>	Page 32 of 40
<b>Warning: Check DW Docs revision to ensure you are using the correct revision.</b>			



# WELLSITE CLEARANCE REPORT PROPOSED WELL GC584-A


BLOCK 584, GREEN CANYON  
GULF OF MEXICO

Oceaneering Document Number:	227580-OII-RPT-WSC-01	Available Data	AUV & 3D Seismic
Client Document Number:	N/A	Area	GC584
Client:	BP America	Lease Number	OCS-G-36297

## REVISION HISTORY

Rev	Reason For Issue	Author	Reviewed	Approved	Rev Date
A	Client Review	S. Haney	J. Thompson	L. Samuel	06 May 2024
0	Final Issue	S. Haney	L. Greene	L. Samuel	09 May 2024

## Signature Box

  
\_\_\_\_\_  
Stephen Haney  
Senior Geoscientist

May 09, 2024

BP America Inc.  
501 Westlake Park Blvd  
Houston, TX 77079

**Re: Tophole Drilling Hazards and Wellsite Clearance of  
Proposed Well GC584-A, Green Canyon**

**Attn: Lisa Majzlik**

Please find within this digital delivery revision 0 of files pertaining to the above-mentioned project. These include:

- PDF files of the wellsite clearance report, accompanying maps and figures, and the Tophole Prognosis diagram.

Oceaneering appreciates this opportunity to be of service. Please feel free to contact me, or Lynn Samuel ([lbsamuel@oceaneering.com](mailto:lbsamuel@oceaneering.com)), if you need additional information or have any questions pertaining to the findings enclosed.

A handwritten signature in black ink, appearing to read "Stephen Haney".

**Stephen Haney**  
**Senior Geoscientist**

Email: [shaney@oceaneering.com](mailto:shaney@oceaneering.com)

*Oil Project 227580*

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## 1.0 INTRODUCTION

BP America Inc. (BP) contracted Oceaneering International, Inc. (OII) to prepare a wellsite clearance letter for the proposed location of Well GC584-A in Block 584, Green Canyon Area of the Gulf of Mexico. The data used for this wellsite clearance letter include high-resolution geophysical data collected by OII's *O-Surveyor III*<sup>TM</sup> Autonomous Underwater Vehicle (AUV) for BP America, Inc. in 2023, and 3D seismic data volumes provided by BP. OII completed an AUV and 3D seismic geohazards report titled, "Archaeological and Geohazard Assessment, Blocks 540 (OCS-G-37351) and 584 (OCS-G-36297), Green Canyon Area, Gulf of Mexico" in February 2024 for BP (OII, 2024). This wellsite clearance letter is based on findings provided within that report.

This letter provides a tophole drilling prognosis and addresses seafloor and subsurface conditions within a 2,000-foot radius centered at the Proposed Well GC584-A location. The depth limit of the investigation (DLI), based on previous interpretation, is approximately 6,500 feet below the mudline (BML).

This assessment and all enclosures presented with this letter comply with the Bureau of Ocean Energy Management (BOEM) and Bureau of Safety and Environmental Enforcement (BSEE) guidelines provided in Notice to Lessees (NTL) No. 2022-G01 (Shallow Hazards Program), NTL No. 2005-G07 (Archaeological Resource Surveys and Reports), and NTL No. 2009-G40 (Deepwater Benthic Communities). These NTLs are current due to the elimination of NTL expiration dates through NTL-2015-N02.

## 2.0 PROPOSED WELLSITE

The entirety of Proposed Well GC584-A (from seafloor to DLI) is in Block 584. Above the DLI, the proposed well is presumed not to deviate. The coordinates for the Proposed Well GC584-A surface location are tabulated below:

Table 1: GC584-A Proposed Well Location

EASTING (Feet)	NORTHING (Feet)	LONGITUDE	LATITUDE	BLOCK CALLS (Feet)	
2,178,130.00	9,944,945.00	91°20'32.641" W	27°23'45.798" N	7,790.00 FEL	2,575.00 FNL

One potential re-spud location was provided by BP. This re-spud location is located 150 feet northeast of Proposed Well GC584-A. Due to the proximity of the re-spud location to the proposed well, geologic conditions are expected to be approximately the same at both well locations. The proposed surface re-spud location is shown below and on the accompanying maps:

Table 2: GC584-A Re-spud Well Location (GC584-B)

Re-spud Well	EASTING (Feet)	NORTHING (Feet)	LONGITUDE	LATITUDE	BLOCK CALLS (Feet)	
GC584-B	2,178,248.25	9,945,036.31	91°20'31.315" W	27°23'46.687" N	7,671.75 FEL	2,483.69 FNL

The geodetic datum used for this project is the North American Datum of 1927 (NAD27) with the Clarke 1866 Ellipsoid. The datum is projected using the Universal Transverse Mercator (UTM), Zone 15 North (15N) with a central meridian at 93°00'W, a false easting of 1,640,416.67 feet at the central meridian, and a false northing of 0.00 feet at 00°00'N. All coordinates given are presented in this projection within

this letter and on the maps (Sheets 1 through 6). All grid units, as well as scales and measurements, are in U.S. Survey Feet.

The Proposed Well GC584-A and re-spud well (Proposed Well GC584-B) surface locations are displayed on the Color Shaded Bathymetry Map (Sheet 1), Seafloor Gradient Map (Sheet 2), Side Scan Sonar Mosaic Map (Sheet 3), Seafloor Amplitude Map (Sheet 4), Seafloor Features Map (Sheet 5), and Subsurface Features Map (Sheet 6). Sheet Maps depicting seafloor data display a 2,000-foot radius circle centered at the surface hole location. Sheet 6 displays subsurface data and has a 500-foot radius circle centered at the proposed well location.

## 3.0 AVAILABLE DATA AND METHODOLOGY

### 3.1 AUV DATA

AUV data were collected by OII in September 2023 onboard the M/V *Ocean Project* using the *O-Surveyor III*<sup>TM</sup> Autonomous Underwater Vehicle (AUV). The data types provided include multibeam bathymetric mapping, high-resolution side scan sonar imagery, and subbottom profiles collected at an altitude of 40 meters (~131 feet) above the seafloor. The AUV remote-sensing instruments included Simrad EM-2040 Multibeam Echosounder, an EdgeTech 2200M Full Spectrum Chirp Dual-Frequency Side Scan Sonar (120 and 410 kHz), and an EdgeTech DW106 Chirp Subbottom Profiler (1.5-10 kHz).

The 2023 AUV survey grid consisted of 39 north-south primary survey lines with 150-meter (492-foot) line spacing (Lines 101 to 139). Twenty-two east-west lines tied the survey grid together (Lines 201 through 222). The survey grid provided overlapping coverage for the side scan sonar and multibeam echosounder and representative coverage for the subbottom profiler.

### 3.2 3D SEISMIC DATA

Two 3D seismic volumes used for this wellsite clearance assessment were provided by BP in SEG-Y format. The time dataset was processed at a 4-millisecond sample rate and the depth dataset was processed at a 10-foot sample rate. The depth dataset was interpreted by OII to a record length of approximately 6,500 feet BML (OII, 2024). The inlines of the 3D data volumes are oriented west to east while the crosslines are oriented north to south. Inlines are spaced at a 20-meter (~65.62-foot) interval and crosslines are spaced at a 12.5-meter (~41.01-foot) interval and are depicted on Sheets 5 and 6.

The 3D seismic data are zero-phase, and the seafloor reflector is represented by a strong, positive-amplitude peak flanked by troughs with absolute amplitude values of less than one-half of the peak value. The seismic data provided adequate screening of the regional seafloor and shallow geologic conditions and large-scale geohazards. Figure 1 is a representative power spectrum of the data at the proposed well location showing that the seismic data have the frequency content necessary for analysis of amplitude anomalies for shallow gas.

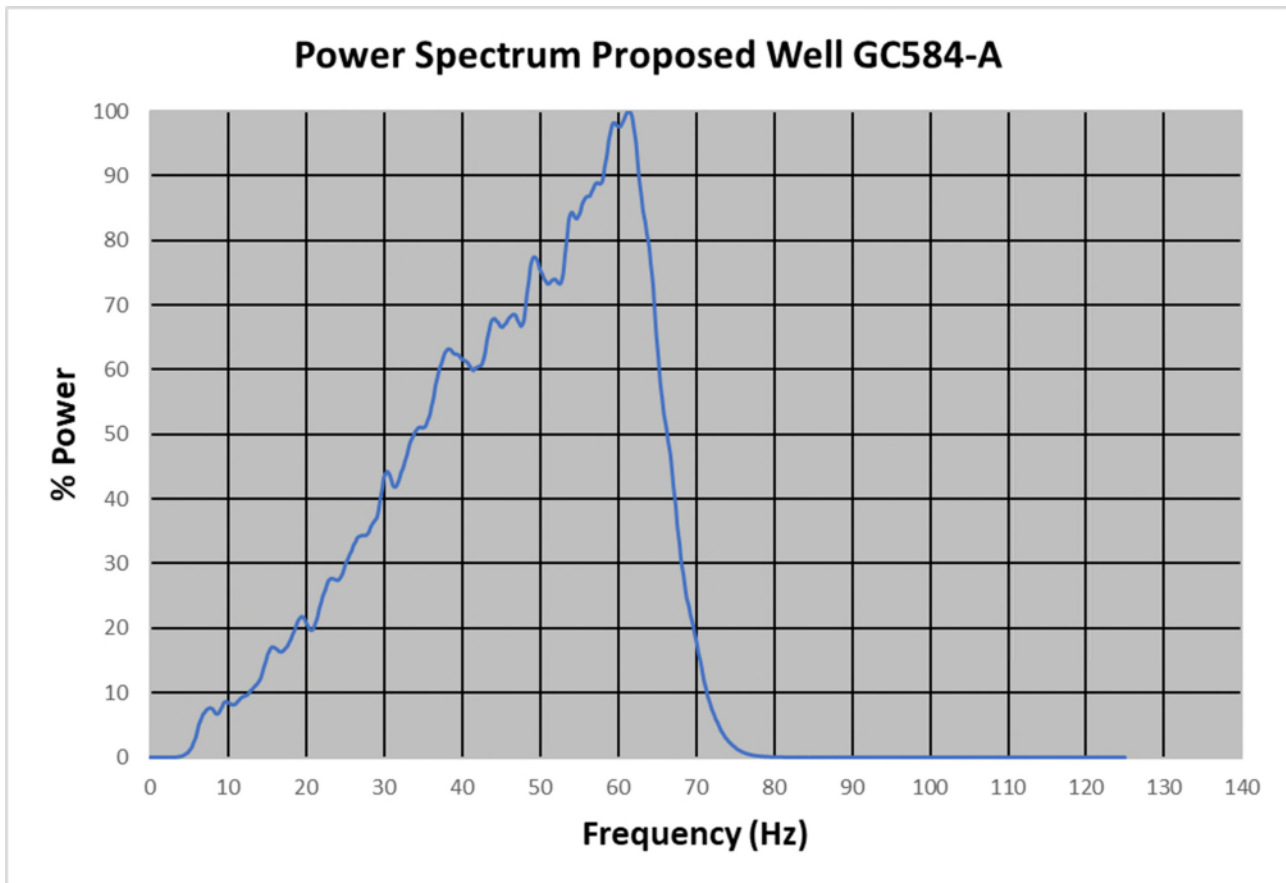


Figure 1. Power spectrum at Proposed Well GC584-A.

## 4.0 SEAFLOOR CHARACTERISTICS

The water depth at the proposed GC584-A surface location is -4,092 feet mean sea level (MSL). Within a 2,000-foot radius around the proposed well, the seafloor depth ranges from -3,899 feet MSL in the west to -4,211 feet MSL in the east (Sheet 1). The seafloor at and around the proposed well is undulating and slopes to the east at a gradient of 4.5° at the proposed well location (Sheet 2).

### 4.1 SEAFLOOR SEDIMENT AND HAZARDS

The seafloor exhibits generally low side scan sonar reflectivity and low to moderate backscatter intensity within 2,000 feet of the proposed well, suggesting the seafloor sediments are finely textured (Figure 2; Sheet 3). The proposed well lies within an interpreted gully, and features interpreted within 2,000 feet of Proposed Well GC584-A include seafloor channels, ridges, and gullies. There are no seafloor faults, seafloor amplitude anomalies, hardgrounds, or any other seafloor features that may have adverse effects on drilling operations (Sheet 4 and Sheet 5).

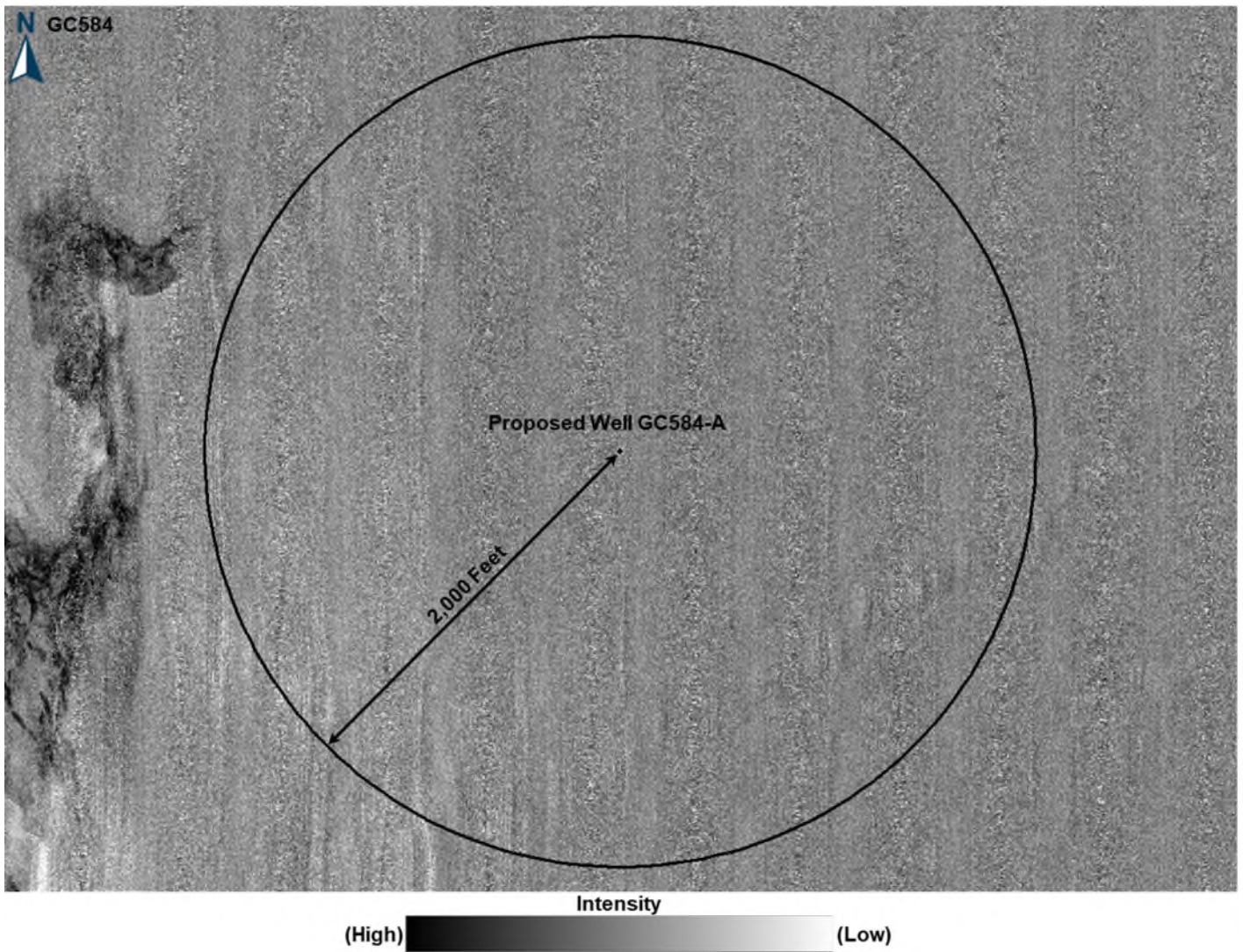


Figure 2. Multibeam backscatter of Proposed Well GC584-A.

#### 4.2 POTENTIAL DEEPWATER BENTHIC COMMUNITIES

The assessment of the AUV and 3D seismic datasets did not identify any potential high-density deepwater benthic community habitats within the 2,000-foot radius (Sheet 3 and Sheet 4). Therefore, potential impact to deepwater benthic communities during drilling operations is considered negligible.

### 4.3 MAN-MADE FEATURES

The review of AUV data, OII's proprietary database, and BOEM/BSEE public databases revealed there is no existing infrastructure within 2,000 feet of the proposed well location (Sheet 5).

There are three sonar contacts identified within 2,000 feet of the proposed well location (Sheet 3). The closest sonar contact is Sonar Contact 59, approximately 760 feet southwest of the proposed well location. All three sonar contacts (57, 59, and 60) are interpreted to be modern debris and were given the standard hazard avoidance of 100 feet.

### 5.0 SUBSURFACE GEOHAZARDS AND STRATIGRAPHY

AUV chirp subbottom profiles and 3D seismic data were used to assess subsurface geology. Six stratigraphic units (Unit 1 to Unit 6), each consisting of one or more distinctive intervals, were interpreted at the proposed well location (Figure 6, Figure 7, and Figure 8).

The criteria for determining the potential for encountering shallow gas, gas hydrates, and shallow water flow for each interpreted unit are defined in Figure 3, Figure 4, and Figure 5, respectively. For full details and background information for each of these geohazards please refer to the geohazard assessment (OII, 2024).

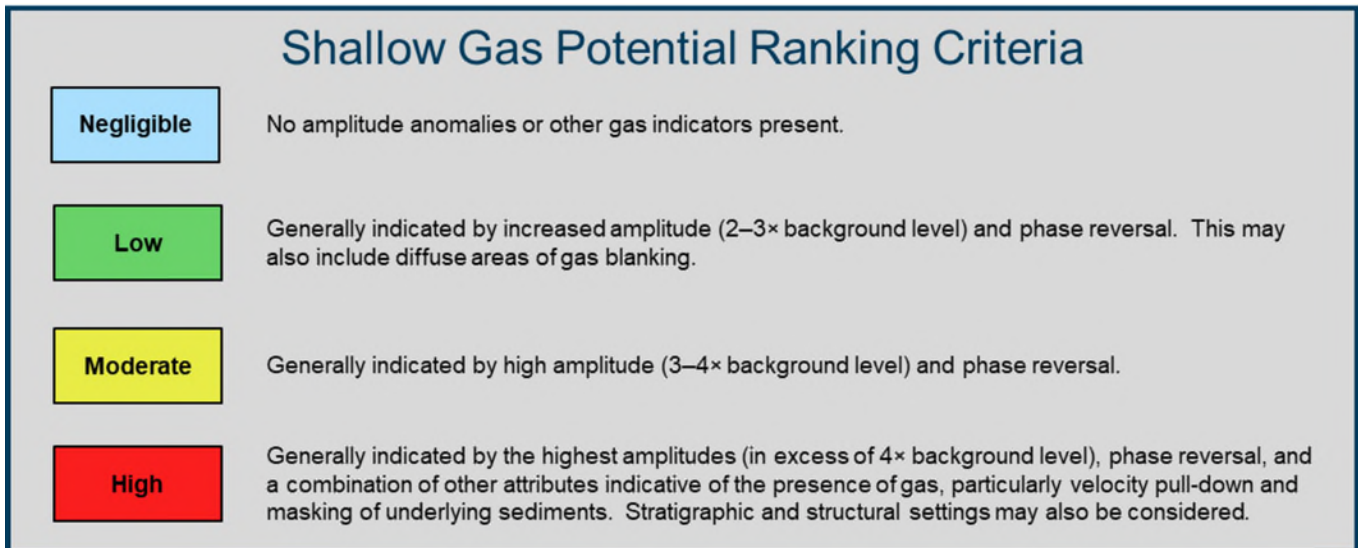


Figure 3. Geologic and seismic characteristics to determine potential for shallow gas.

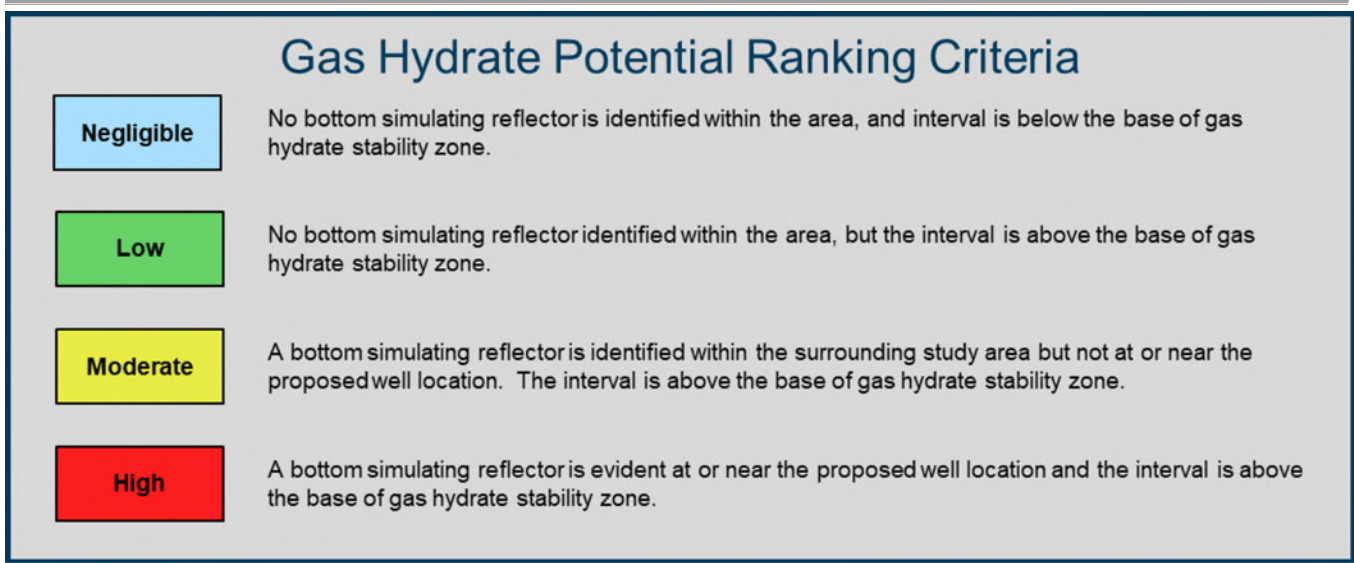


Figure 4. Geologic characteristics to determine potential for gas hydrates.

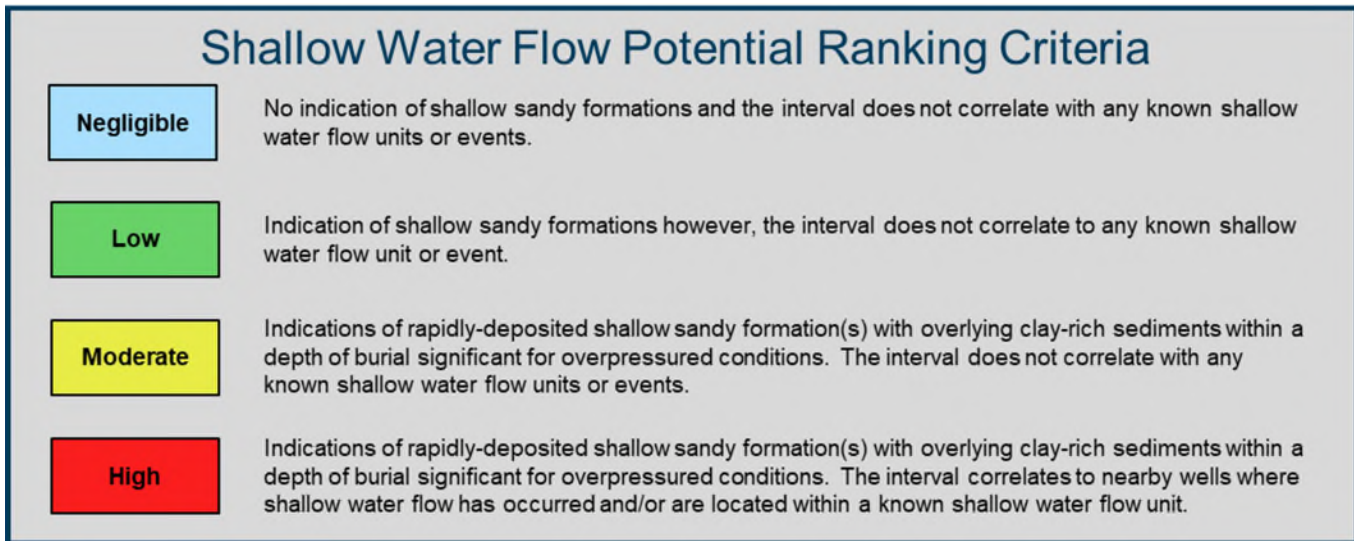


Figure 5. Geologic and seismic characteristics to determine potential for shallow water flow.

## 5.1 GENERAL GEOHAZARD POTENTIAL AT PROPOSED WELL

Proposed Well GC584-A was assessed for potential hazards between the seafloor and the DLI. This assessment assumes open-hole conditions and does not take into account engineering controls. Please note that this assessment addresses only the *potential* for encountering a geohazard event and does not include the *severity* of the possible event.

### Shallow Gas

There are no amplitude anomalies indicative of shallow gas identified within a 500-foot radius of the proposed well (Sheet 6). Faults observed in the shallow section are generally not deep-seated and may not provide a migration pathway for thermogenic gas. Potentially porous, sand-prone sediments that

may serve as a reservoir for shallow gas accumulations were identified in the area, but do not have the seismic indicators for shallow gas.

### Gas Hydrates

No BSR was identified in the seismic data near the proposed GC584-A location. The base of the GHSZ was calculated at 1,417 feet BML at Proposed Well GC584-A.

### Shallow Water Flow

The proposed well location does not lie within interpreted bounds of any known SWF unit. The closest reported SWF occurred ~14.4 miles to the northeast of Proposed Well GC584-A. This event occurred in the southeast quadrant of GC448 at a depth of 1,230 feet BML. This SWF was categorized as a low-severity flow and well integrity was maintained. There is no stratigraphic continuity interpreted between SWF in GC448 and the Proposed Well GC584-A.

## 6.0 TOPHOLE ASSESSMENT

### Unit 1 (Seafloor to Horizon 10)

Unit 1 (Figure 6, Figure 7, Figure 8, and Figure 9) is better resolved on the subbottom profiler data and consists of predominantly low- to moderate-amplitude, parallel, continuous reflectors. These reflectors are interpreted to represent hemipelagic clay drape. Between approximately 140 feet and 180 feet BML, the proposed well will penetrate an interbedded clay- and silt-dominated turbidite deposit (Figure 6). Unit 1 is 238 feet thick at the proposed wellsite and will be encountered between -4,092 feet and -4,330 feet MSL (Figure 9).

There are no amplitude anomalies within 500 feet, and the likelihood of encountering shallow gas within this unit is interpreted to be negligible at the proposed well location (Figure 9).

Unit 1 is above the GHSZ base. The potential for encountering gas hydrates at the proposed well location is interpreted to be low (Figure 9).

Due to the shallow depth of burial and lack of interpreted sands, sediments in this unit have a negligible potential for SWF (Figure 9).

### Unit 2 (Horizon 10 to Horizon 20)

Unit 2 (Figure 7, Figure 8, and Figure 9) consists of three intervals separated by interfaces. The upper interval consists of low- to moderate-amplitude, semi-parallel, semi-continuous reflectors that are interpreted to represent fine-grained turbidite deposits. The middle interval comprises low- to high-amplitude, semi-parallel, semi-continuous reflectors. These reflectors are interpreted to represent fine-grained mass transport deposits with interbedded channel sands. The reflectors within the lower interval of Unit 2 consist of low- to moderate-amplitude, parallel, continuous reflectors, and are interpreted to represent stratified silt- and clay-dominated turbidite deposits. At the Proposed Well GC584-A location, the upper interval of the unit is 170 feet thick and occurs between 238 feet and 408 feet BML (-4,330 feet to -4,500 feet MSL) and the middle portion of the unit is 759 feet thick and occurs between 408 feet and 1,167 feet BML (-4,500 feet to -5,259 feet MSL; Figure 9). The lower interval is 402 feet thick and occurs between 1,167 feet and 1,569 feet BML (-5,259 feet to -5,661 feet MSL; Figure 9). The base of the lower interval of Unit 2 is marked by Horizon 20

There are no amplitude anomalies within 500 feet, and the likelihood of encountering shallow gas within this unit is interpreted to be negligible at the proposed well location (Figure 9).

The GHSZ base falls within Unit 2 at 1,417 feet BML. The potential for encountering gas hydrates at the proposed well location above 1,417 feet BML (-5,509 feet MSL) is interpreted to be low (Figure 9). The likelihood of encountering gas hydrates below the depth for the GHSZ base is interpreted to be negligible.

The lack of interpreted sands within the upper and lower intervals results in a negligible potential for encountering SWF within these intervals. Due to interpreted sands within the middle interval, there is low potential for SWF (Figure 9).

Unit 3 (Horizon 20 to Horizon 30)

Unit 3 (Figure 7, Figure 8, and Figure 9) consists of low- to moderate-amplitude, semi-parallel, semi-continuous reflectors. The reflectors within Unit 3 are interpreted as clay- and silt-dominated turbidite deposits. The unit is 250 feet thick at the Proposed Well GC584-A location and occurs between 1,569 feet and 1,819 feet BML (-5,661 feet and -5,911 feet MSL; Figure 9).

There are no amplitude anomalies within 500 feet; therefore, the well is assigned a negligible potential for shallow gas (Figure 9).

Unit 3 is below the GHSZ base. The potential for encountering gas hydrates at the proposed well location is interpreted to be negligible (Figure 9).

No apparent sands are interpreted at the proposed location; therefore, the well is assigned a negligible potential for SWF (Figure 9).

Unit 4 (Horizon 30 to Horizon 40)

Unit 4 (Figure 7, Figure 8, and Figure 9) consists of low- to moderate-amplitude, parallel, continuous reflectors overlying low-amplitude, chaotic, semi-continuous to discontinuous reflectors. The sediments in the upper portion of Unit 4 are interpreted as stratified silt- and clay-dominated turbidite deposits, while the sediments in the lower portion of the unit are interpreted as silt- and clay-dominated channel deposits. At the Proposed Well GC584-A location, the upper part of the unit is 240 feet thick and will be encountered between 1,819 feet and 2,059 feet BML (-5,911 feet and -6,151 feet MSL); the lower part of the unit is 1,242 feet thick and occurs between 2,059 feet and 3,301 feet BML (-6,151 feet and -7,393 feet MSL; Figure 9).

There are no amplitude anomalies within 500 feet; therefore, the well is assigned a negligible potential for shallow gas (Figure 9).

No apparent sands are interpreted at the proposed location; therefore, the well is assigned a negligible potential for SWF (Figure 9).

Unit 4 is below the GHSZ base. The potential for encountering gas hydrates at the proposed well location is interpreted to be negligible (Figure 9).

Unit 5 (Horizon 40 to Horizon 50)

Unit 5 (Figure 7, Figure 8, and Figure 9) consists of low-amplitude, semi-parallel, semi-continuous reflectors. At the Proposed Well GC584-A location, the unit is 1,141 feet thick and occurs between 3,301 feet and 4,442 feet BML (-7,393 feet to -8,534 feet MSL; Figure 9). The sediments in Unit 5 are interpreted as coarse-grained turbidite deposits with interbedded coarse-grained MTDs.

There are no amplitude anomalies within 500 feet; therefore, there is a negligible potential for encountering shallow gas (Figure 9).

Unit 5 is below the GHSZ base. The potential for encountering gas hydrates at the proposed well location is interpreted to be negligible (Figure 9).

A low SWF potential is assessed for Unit 5 due to the possible presence of sands within the unit (Figure 9).

Unit 6 (Horizon 50 to DLI/6,500 feet BML)

Unit 6 (Figure 7, Figure 8, and Figure 9) consists of low-amplitude, semi-continuous, sub-parallel reflectors. The sediments in Unit 6 are interpreted as coarse-grained turbidites with interbedded sands. At the Proposed Well GC584-A location, the unit is 2,058 feet thick and occurs between 4,442 feet and 6,500 feet BML (-8,534 feet to -10,592 feet MSL; Figure 9).

There are no amplitude anomalies within 500 feet; therefore, there is a negligible potential for encountering shallow gas (Figure 9).

Unit 6 is below the GHSZ base. The potential for encountering gas hydrates at the proposed well location is interpreted to be negligible (Figure 9).

A low SWF potential is assessed for Unit 6 due to the possible presence of sands within the unit (Figure 9).

Faults

The proposed vertical wellbore will not encounter any faults in the shallow section (Figure 9).

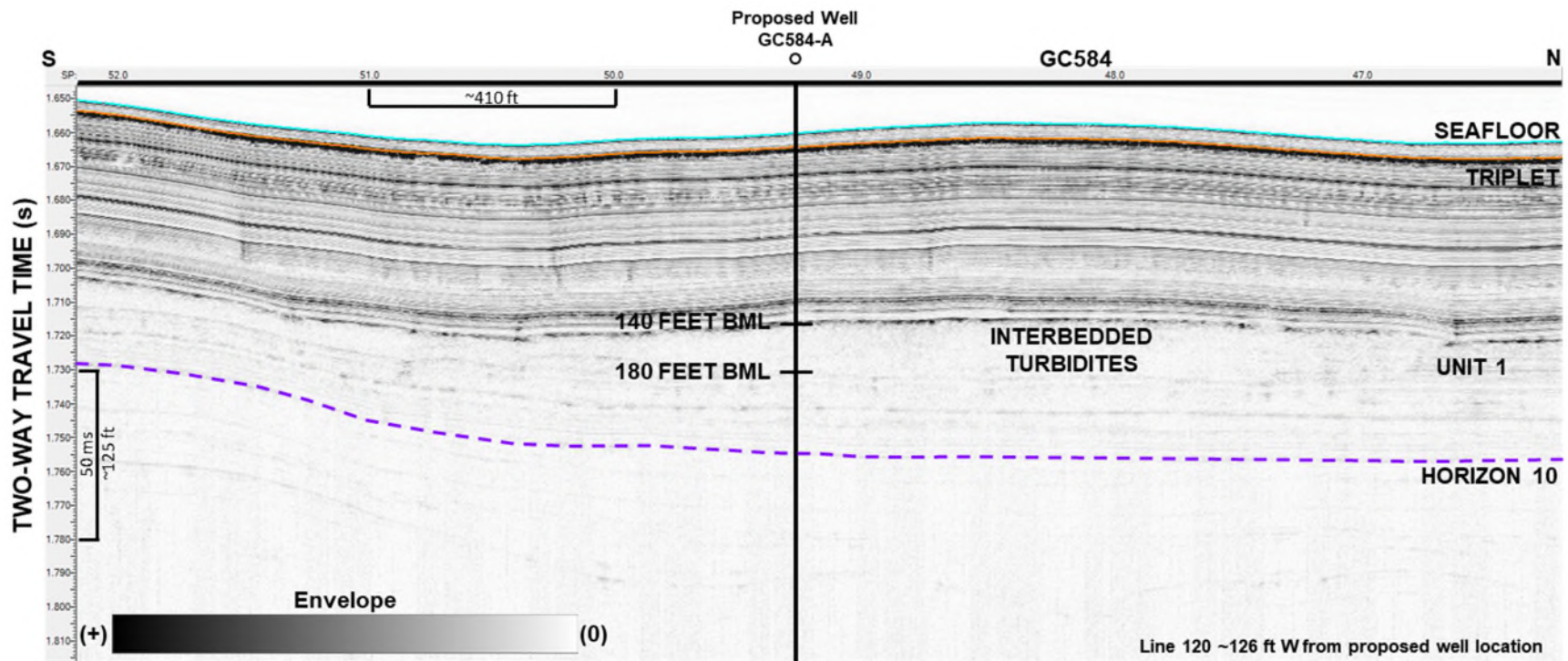


Figure 6. Portion of SBP Line 120 showing shallow stratigraphy at Proposed Well GC584-A.

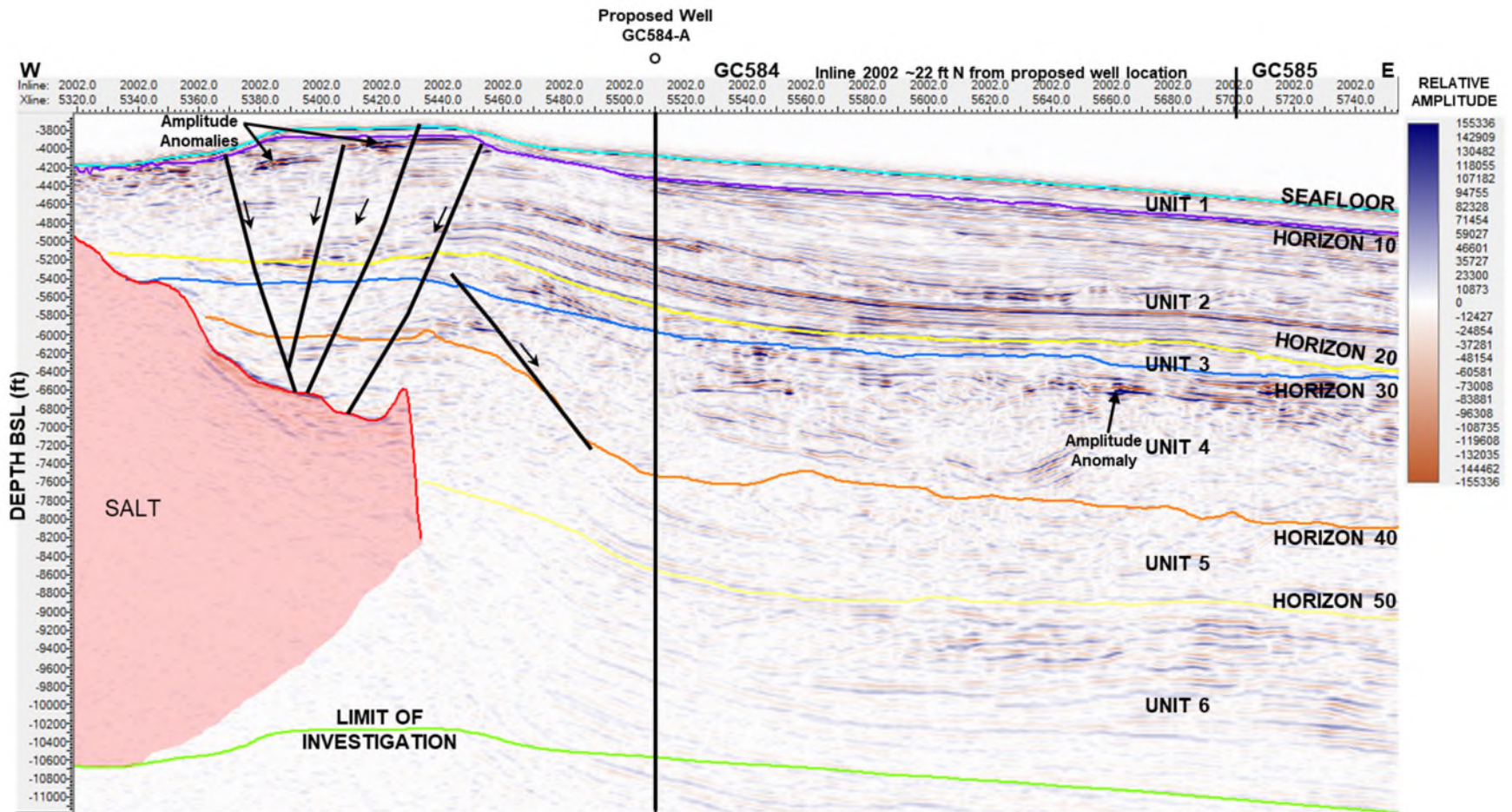


Figure 7. Portion of 3D seismic inline 2002 near Proposed Well GC584-A.

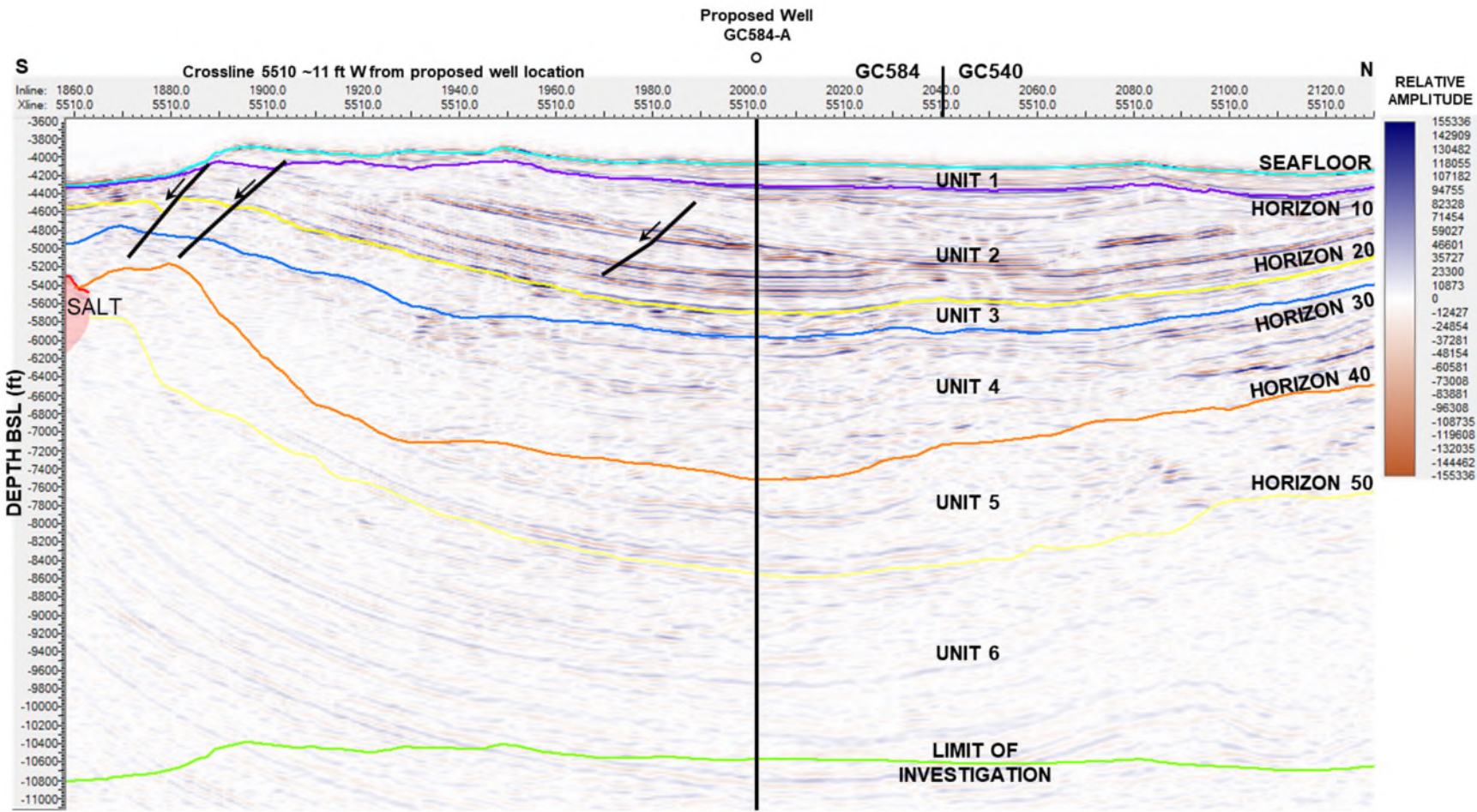
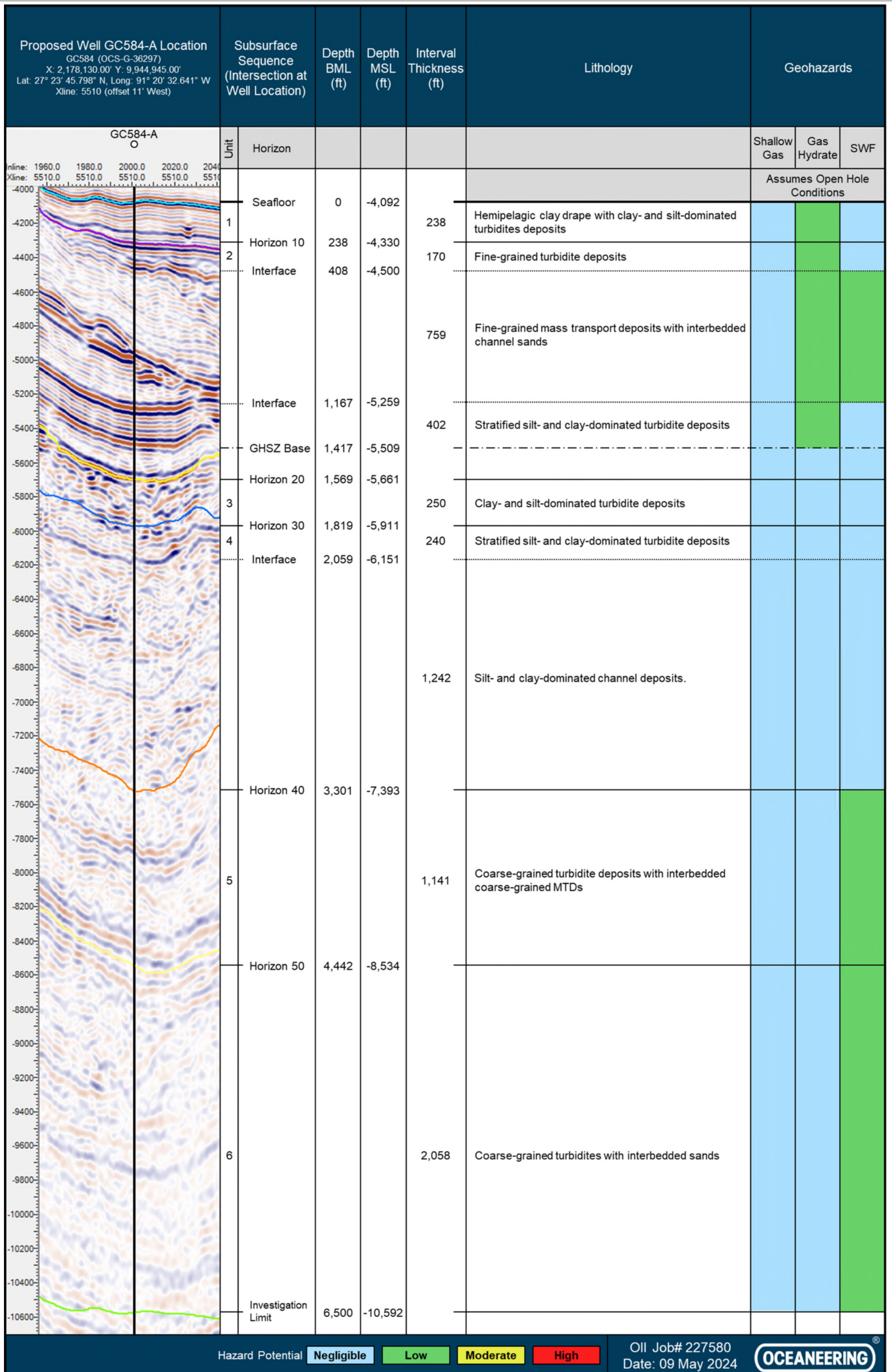


Figure 8. Portion of 3D seismic crossline 5510 near Proposed Well GC584-A.



Hazard Potential **Negligible** **Low** **Moderate** **High**

OII Job# 227580  
Date: 09 May 2024



Figure 9. Tophole Prognosis for Proposed Well GC584-A.

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## 7.0 CONCLUSIONS AND RECOMMENDATIONS

- The water depth at the Proposed Well GC584-A surface location is -4,092 feet MSL. The proposed wellsite is in an area of slightly undulating seafloor with a gradient of 4.5° to the east. No significant seafloor features that could interfere with drilling activities occur within 2,000 feet of the proposed wellsite.
- The low side scan sonar reflectivity and low backscatter intensity indicate fine-textured seafloor sediments within a 2,000-foot radius. There are no seafloor faults or any other seafloor features that may have adverse effects on drilling operations within 2,000 feet of the proposed wellsite.
- The review of AUV and 3D seismic data did not identify any potential high-density deepwater benthic community habitats within a 2,000-foot radius. Therefore, the potential impact to deepwater benthic communities during drilling operation is considered negligible.
- There was no existing infrastructure identified within 2,000 feet of the proposed well. There are three sonar contacts identified within 2,000 feet of the proposed well. The closest sonar contact is 760 feet southwest of the proposed well location, and all sonar contacts have been assigned a standard 100-foot hazard avoidance.
- No amplitude anomalies were identified within 500 feet of the proposed well. Unit 1 through Unit 6 all have negligible potential for shallow gas.
- Above the depth limit of investigation (Horizon 6), the proposed well will not penetrate any faults or subsurface features that may have adverse effects to the drilling operations.
- Unit 1, the upper and lower intervals of Unit 2, Unit 3, and Unit 4 have negligible potential for SWF. The sandy intervals and sufficient depth for overpressured conditions in the remainder of the bore (middle interval of Unit 2, Unit 5, and Unit 6) exhibit a low potential for SWF. Closely monitoring the wellhead is recommended during connections and flow checks for SWF.
- There was no indication of gas hydrates, associated geologic features, or BSRs at the proposed wellsite. The calculated depth of the gas hydrate stability zone base is 1,417 feet BML. The proposed well is assessed a low potential for encountering gas hydrates above the GHSZ base and a negligible potential below the GHSZ base.

## 8.0 REFERENCES

Bureau of Ocean Energy Management, and Bureau of Safety and Environmental Enforcement, 2005. "Notice to Lessees and Operators of Federal Oil, Gas, and Sulphur Leases in the Outer Continental Shelf, Gulf of Mexico OCS Region: Archaeological Resource Surveys and Reports", U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico NTL No. 2005-G07.

Bureau of Ocean Energy Management, and Bureau of Safety and Environmental Enforcement, 2010. "Notice to Lessees and Operators of Federal Oil, Gas, and Sulphur Leases and Pipeline Right-of-Way Holders in the Outer Continental Shelf, Gulf of Mexico OCS Region: Deepwater Benthic Communities", U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico NTL No. 2009-G40.

Bureau of Ocean Energy Management, 2015. "Notice to Lessees and Operators of Federal Oil and Gas Leases in the Outer Continental Shelf, Gulf of Mexico OCS Region: Elimination of Expiration Dates on Certain Notices to Lessees and Operators Pending Review and Reissuance", U.S. Department of the Interior, Gulf of Mexico NTL No. 2015-N02.

Bureau of Ocean Energy Management, 2022. "Notice to Lessees and Operators of Federal Oil and Gas, and Sulphur Leases in the Gulf of Mexico Outer Continental Shelf (OCS) Region", U.S. Department of the Interior, Gulf of Mexico NTL No. 2022-G01.

Oceaneering International Inc, 2024. "Archaeological and Geohazard Assessment, Blocks 540 (OCS-G-37351) and 584 (OCS-G-36297), Green Canyon Area, Gulf of Mexico".



# WELLSITE CLEARANCE REPORT PROPOSED WELL GC584-C


BLOCK 584, GREEN CANYON  
GULF OF MEXICO

Oceaneering Document Number:	227580-OII-RPT-WSC-02	Available Data	AUV & 3D Seismic
Client Document Number:	N/A	Area	GC584
Client:	BP America	Lease Number	OCS-G-36297

## REVISION HISTORY

Rev	Reason For Issue	Author	Reviewed	Approved	Rev Date
A	Client Review	S. Haney	J. Thompson	L. Samuel	06 May 2024
0	Final Issue	S. Haney	L. Greene	L. Samuel	09 May 2024

## Signature Box

  
\_\_\_\_\_  
Stephen Haney  
Senior Geoscientist

May 09, 2024

BP America Inc.  
501 Westlake Park Blvd  
Houston, TX 77079

**Re: Tophole Drilling Hazards and Wellsite Clearance of  
Proposed Well GC584-C, Green Canyon**

**Attn: Lisa Majzlik**

Please find within this digital delivery revision 0 of files pertaining to the above-mentioned project. These include:

- PDF files of the wellsite clearance report, accompanying maps and figures, and the Tophole Prognosis diagram.

Oceaneering appreciates this opportunity to be of service. Please feel free to contact me, or Lynn Samuel ([lbsamuel@oceaneering.com](mailto:lbsamuel@oceaneering.com)), if you need additional information or have any questions pertaining to the findings enclosed.

A handwritten signature in black ink, appearing to read "Stephen Haney".

**Stephen Haney**  
**Senior Geoscientist**

Email: [shaney@oceaneering.com](mailto:shaney@oceaneering.com)

*Oil Project 227580*

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## 1.0 INTRODUCTION

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This letter provides a tophole drilling prognosis and addresses seafloor and subsurface conditions within a 2,000-foot radius centered at the Proposed Well GC584-C location. The depth limit of the investigation (DLI), based on previous interpretation, is approximately 6,500 feet below the mudline (BML).

This assessment and all enclosures presented with this letter comply with the Bureau of Ocean Energy Management (BOEM) and Bureau of Safety and Environmental Enforcement (BSEE) guidelines provided in Notice to Lessees (NTL) No. 2022-G01 (Shallow Hazards Program), NTL No. 2005-G07 (Archaeological Resource Surveys and Reports), and NTL No. 2009-G40 (Deepwater Benthic Communities). These NTLs are current due to the elimination of NTL expiration dates through NTL-2015-N02.

## 2.0 PROPOSED WELLSITE

The entirety of Proposed Well GC584-C (from seafloor to DLI) is in Block 584. Above the DLI, the proposed well is presumed not to deviate. The coordinates for the Proposed Well GC584-C surface location are tabulated below:

Table 1: GC584-C Proposed Well Location

EASTING (Feet)	NORTHING (Feet)	LONGITUDE	LATITUDE	BLOCK CALLS (Feet)	
2,178,400.00	9,946,445.00	91°20'29.424" W	27°24'00.617" N	7,520.00 FEL	1,075.00 FNL

One potential re-spud location was provided by BP. This re-spud location is located 150 feet northeast of Proposed Well GC584-C. Due to the proximity of the re-spud location to the proposed well, geologic conditions are expected to be approximately the same at both well locations. The proposed surface re-spud location is shown below and on the accompanying maps:

Table 2: GC584-C Re-spud Well Location (GC584-D)

Re-spud Well	EASTING (Feet)	NORTHING (Feet)	LONGITUDE	LATITUDE	BLOCK CALLS (Feet)	
GC584-D	2,178,518.25	9,946,536.31	91°20'28.098" W	27°24'01.505" N	7,401.75 FEL	983.69 FNL

The geodetic datum used for this project is the North American Datum of 1927 (NAD27) with the Clarke 1866 Ellipsoid. The datum is projected using the Universal Transverse Mercator (UTM), Zone 15 North (15N) with a central meridian at 93°00'W, a false easting of 1,640,416.67 feet at the central meridian, and a false northing of 0.00 feet at 00°00'N. All coordinates given are presented in this projection within

this letter and on the maps (Sheets 1 through 6). All grid units, as well as scales and measurements, are in U.S. Survey Feet.

The Proposed Well GC584-C and re-spud well (Proposed Well GC584-D) surface locations are displayed on the Color Shaded Bathymetry Map (Sheet 1), Seafloor Gradient Map (Sheet 2), Side Scan Sonar Mosaic Map (Sheet 3), Seafloor Amplitude Map (Sheet 4), Seafloor Features Map (Sheet 5), and Subsurface Features Map (Sheet 6). Sheet Maps depicting seafloor data also display a 2,000-foot radius circle centered at the surface hole location. Sheet 6 displays subsurface data and has a 500-foot radius circle centered at the proposed well location.

## 3.0 AVAILABLE DATA AND METHODOLOGY

### 3.1 AUV DATA

AUV data were collected by OII in September 2023 onboard the M/V *Ocean Project* using the *O-Surveyor III*<sup>TM</sup> Autonomous Underwater Vehicle (AUV). The data types provided include multibeam bathymetric mapping, high-resolution side scan sonar imagery, and subbottom profiles collected at an altitude of 40 meters (~131 feet) above the seafloor. The AUV remote-sensing instruments included Simrad EM-2040 Multibeam Echosounder, an EdgeTech 2200M Full Spectrum Chirp Dual-Frequency Side Scan Sonar (120 and 410 kHz), and an EdgeTech DW106 Chirp Subbottom Profiler (1.5-10 kHz).

The 2023 AUV survey grid consisted of 39 north-south primary survey lines with 150-meter (492-foot) line spacing (Lines 101 to 139). Twenty-two east-west lines tied the survey grid together (Lines 201 through 222). The survey grid provided overlapping coverage for the side scan sonar and multibeam echosounder and representative coverage for the subbottom profiler.

### 3.2 3D SEISMIC DATA

Two 3D seismic volumes used for this wellsite clearance assessment were provided by BP in SEG-Y format. The time dataset was processed at a 4-millisecond sample rate and the depth dataset was processed at a 10-foot sample rate. The depth dataset was interpreted by OII to a record length of approximately 6,500 feet BML (OII, 2024). The inlines of the 3D data volumes are oriented west to east while the crosslines are oriented north to south. Inlines are spaced at a 20-meter (~65.62-foot) interval and crosslines are spaced at a 12.5-meter (~41.01-foot) interval and are depicted on Sheets 5 and 6.

The 3D seismic data are zero-phase, and the seafloor reflector is represented by a strong, positive-amplitude peak flanked by troughs with absolute amplitude values of less than one-half of the peak value. The seismic data provided adequate screening of the regional seafloor and shallow geologic conditions and large-scale geohazards. Figure 1 is a representative power spectrum of the data at the proposed well location showing that the seismic data have the frequency content necessary for analysis of amplitude anomalies for shallow gas.

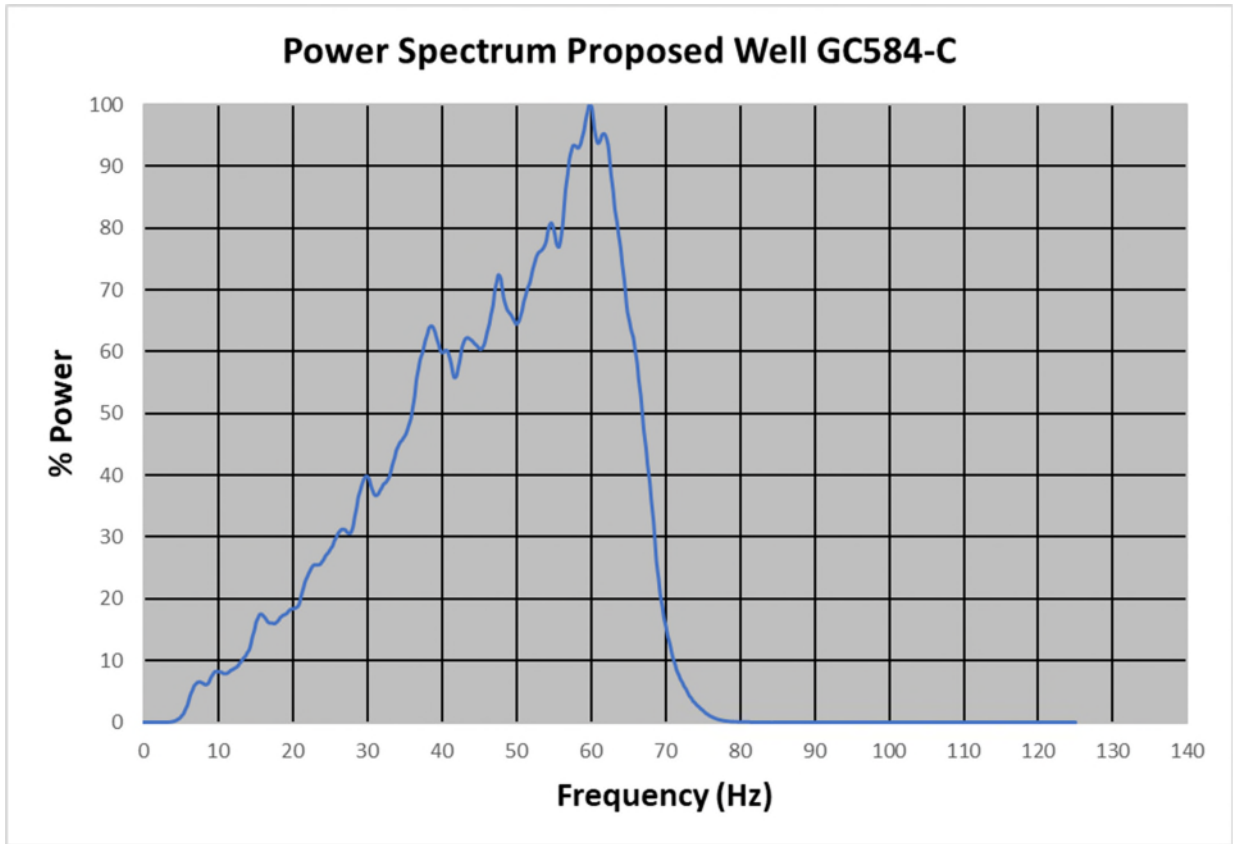


Figure 1. Power spectrum at Proposed Well GC584-C.

## 4.0 SEAFLOOR CHARACTERISTICS

The water depth at the proposed GC584-C surface location is -4,116 feet mean sea level (MSL). Within a 2,000-foot radius around the proposed well, the seafloor depth ranges from -3,948 feet MSL in the west-southwest to -4,248 feet MSL in the east-northeast (Sheet 1). The seafloor at and around the proposed well is undulating and slopes to the east at a gradient of 4.6° at the proposed well location (Sheet 2).

### 4.1 SEAFLOOR SEDIMENT AND HAZARDS

The seafloor exhibits generally low side scan sonar reflectivity and low to moderate backscatter intensity within 2,000 feet of the proposed well, suggesting the seafloor sediments are finely textured (Figure 2; Sheet 3). Features interpreted within 2,000 feet of Proposed Well GC584-C are ridges and gullies. There are no seafloor faults, seafloor amplitude anomalies, hardgrounds, or any other seafloor features that may have adverse effects on drilling operations (Sheet 4 and Sheet 5).

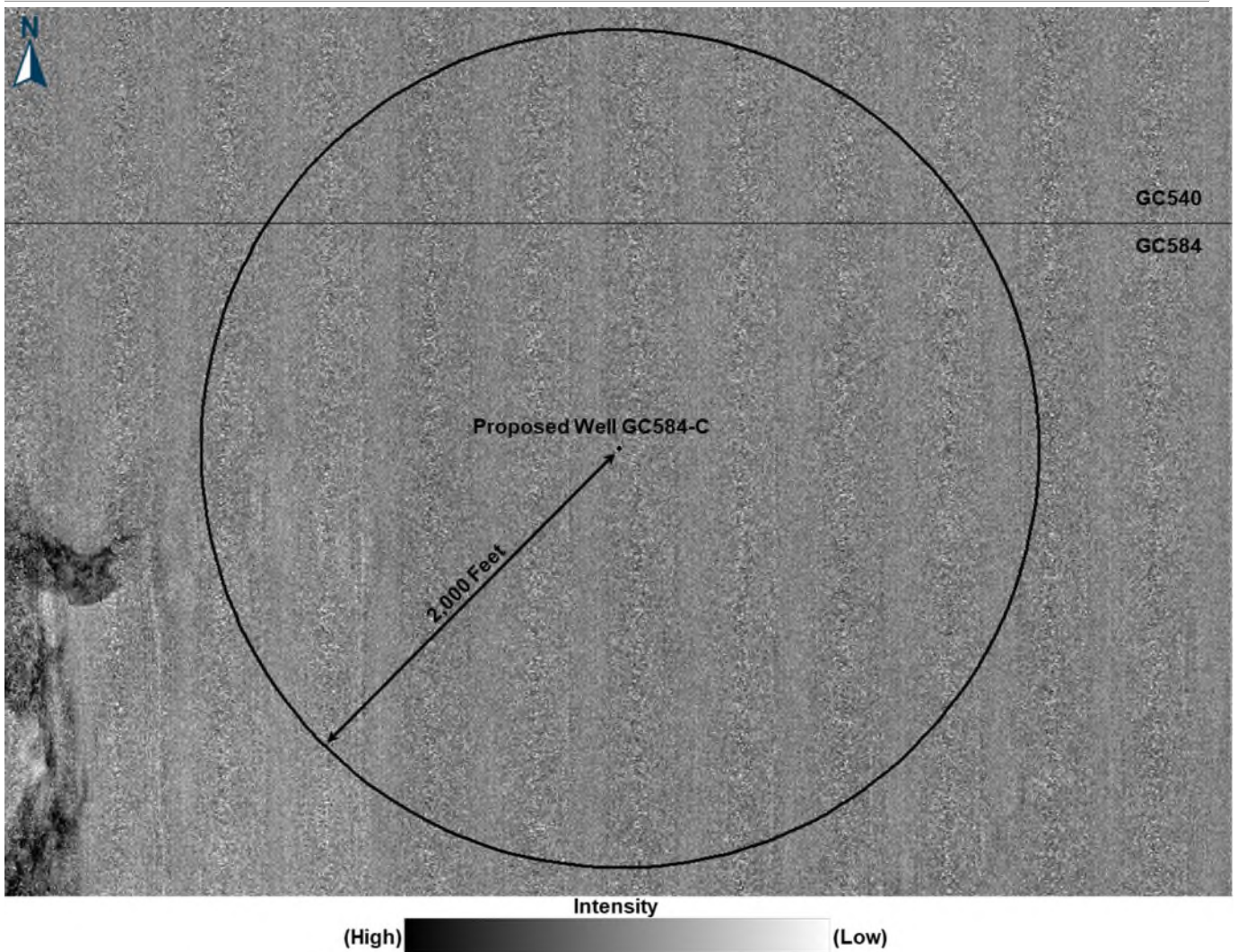


Figure 2. Multibeam backscatter of Proposed Well GC584-C.

#### 4.2 POTENTIAL DEEPWATER BENTHIC COMMUNITIES

The assessment of the AUV and 3D seismic datasets did not identify any potential high-density deepwater benthic community habitats within the 2,000-foot radius (Sheet 3 and Sheet 4). Therefore, potential impact to deepwater benthic communities during drilling operations is considered negligible.

### 4.3 MAN-MADE FEATURES

The review of AUV data, OII's proprietary database, and BOEM/BSEE public databases revealed there is no existing infrastructure within 2,000 feet of the proposed well location (Sheet 5).

There is one sonar contact identified within 2,000 feet of the proposed well location (Sheet 3). Sonar Contact 57 lies approximately 1,840 feet southwest of the proposed well location. The sonar contact is interpreted to be modern debris and was given the standard hazard avoidance of 100 feet.

### 5.0 SUBSURFACE GEOHAZARDS AND STRATIGRAPHY

AUV chirp subbottom profiles and 3D seismic data were used to assess subsurface geology. Six stratigraphic units (Unit 1 to Unit 6), each consisting of one or more distinctive intervals, were interpreted at the proposed well location (Figure 6, Figure 7, and Figure 8).

The criteria for determining the potential for encountering shallow gas, gas hydrates, and shallow water flow for each interpreted unit are defined in Figure 3, Figure 4, and Figure 5, respectively. For full details and background information for each of these geohazards please refer to the geohazard assessment (OII, 2024).

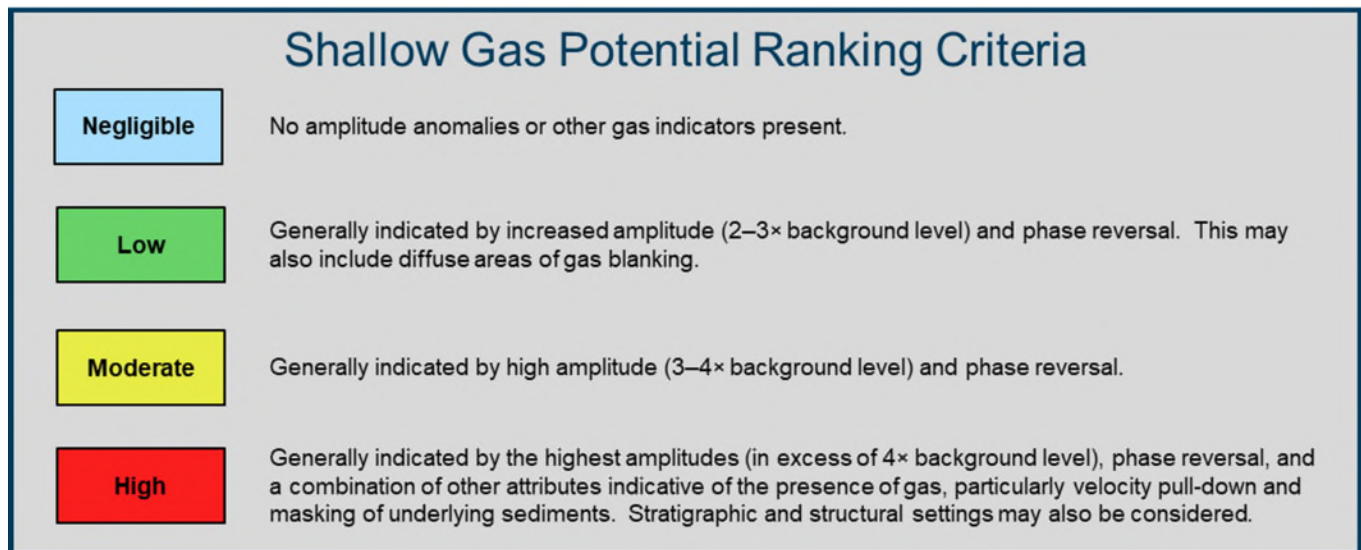


Figure 3. Geologic and seismic characteristics to determine potential for shallow gas.

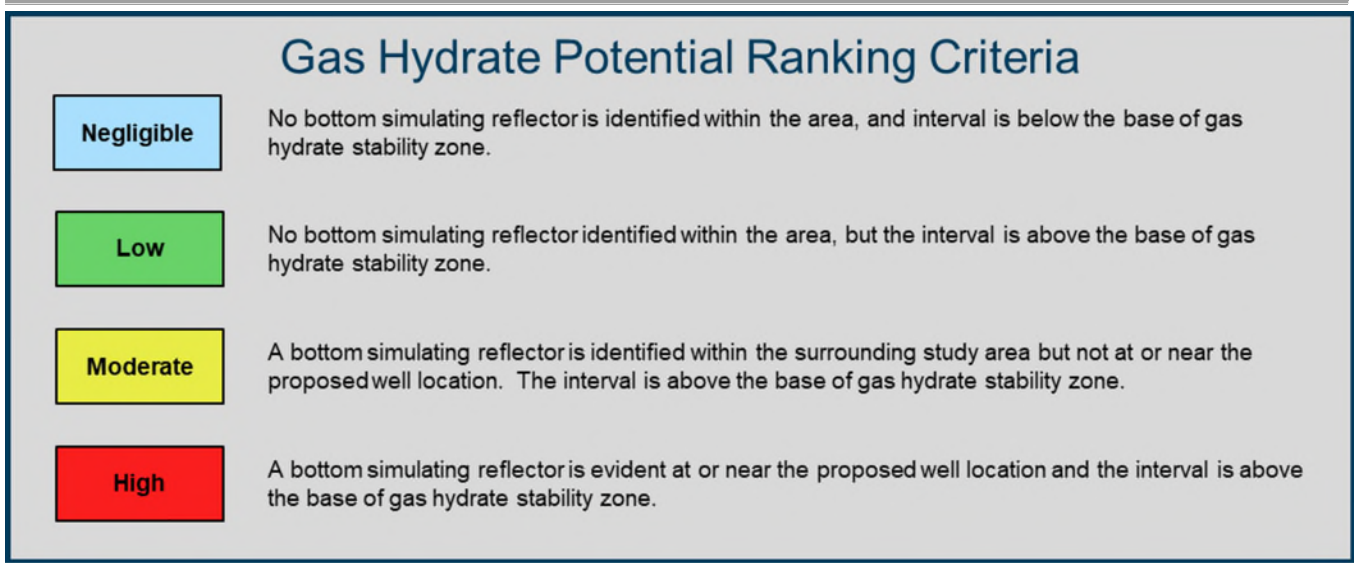


Figure 4. Geologic characteristics to determine potential for gas hydrates.

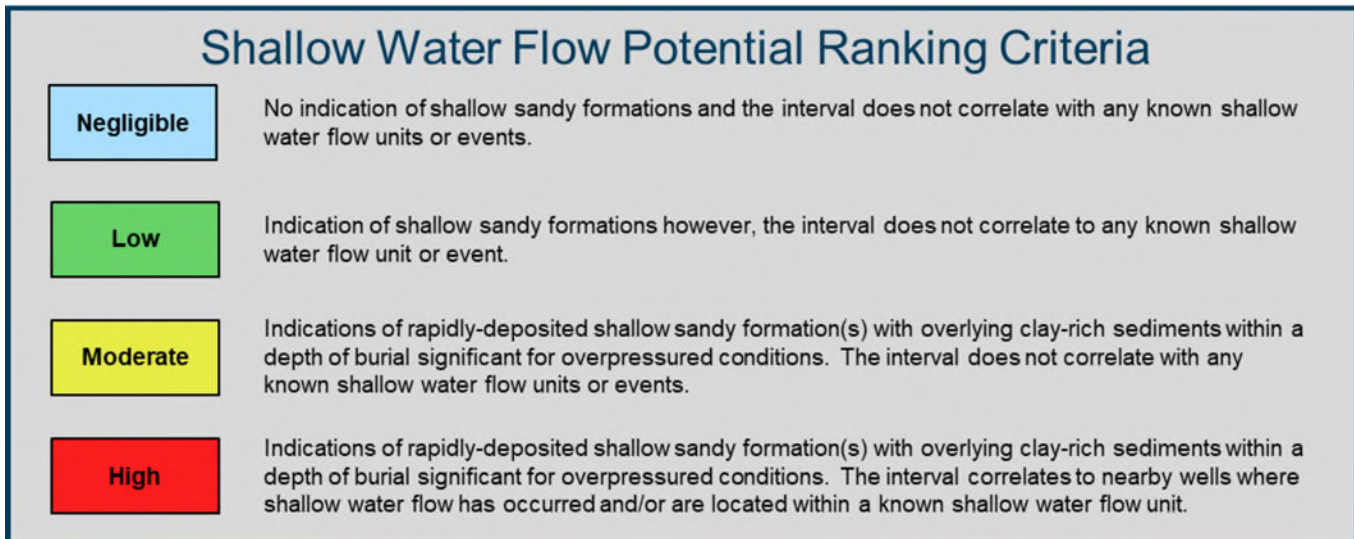


Figure 5. Geologic and seismic characteristics to determine potential for shallow water flow.

## 5.1 GENERAL GEOHAZARD POTENTIAL AT PROPOSED WELL

Proposed Well GC584-C was assessed for potential hazards between the seafloor and the DLI. This assessment assumes open-hole conditions and does not take into account engineering controls. Please note that this assessment addresses only the *potential* for encountering a geohazard event and does not include the *severity* of the possible event.

### Shallow Gas

There are no amplitude anomalies indicative of shallow gas identified within a 500-foot radius of the proposed well (Sheet 6). Faults observed in the shallow section are generally not deep-seated and may not provide a migration pathway for thermogenic gas. Potentially porous, sand-prone sediments that

may serve as a reservoir for shallow gas accumulations were identified in the area, but do not have the seismic indicators for shallow gas.

### Gas Hydrates

No BSR was identified in the seismic data near the proposed GC584-C location. The base of the GHSZ was calculated at 1,422 feet BML at Proposed Well GC584-C.

### Shallow Water Flow

The proposed well location does not lie within interpreted bounds of any known SWF unit. The closest reported SWF occurred ~14.5 miles to the northeast of Proposed Well GC584-C. This event occurred in the southeast quadrant of GC448 at a depth of 1,230 feet BML. This SWF was categorized as a low-severity flow and well integrity was maintained. There is no stratigraphic continuity interpreted between SWF in GC448 and the Proposed Well GC584-C.

## 6.0 TOPHOLE ASSESSMENT

### Unit 1 (Seafloor to Horizon 10)

Unit 1 (Figure 6, Figure 7, Figure 8, and Figure 9) is better resolved on the subbottom profiler data and consists of predominantly low- to moderate-amplitude, parallel, continuous reflectors. These reflectors are interpreted to represent hemipelagic clay drape. Unit 1 is 223 feet thick at the proposed wellsite and will be encountered between -4,116 feet and -4,339 feet MSL (Figure 9).

There are no amplitude anomalies within 500 feet, and the likelihood of encountering shallow gas within this unit is interpreted to be negligible at the proposed well location (Figure 9).

Unit 1 is above the GHSZ base. The potential for encountering gas hydrates at the proposed well location is interpreted to be low (Figure 9).

Due to the shallow depth of burial and lack of interpreted sands, sediments in this unit have a negligible potential for a SWF (Figure 9).

### Unit 2 (Horizon 10 to Horizon 20)

Unit 2 (Figure 7, Figure 8, and Figure 9) consists of three intervals separated by interfaces. The upper interval consists of low- to moderate-amplitude, semi-parallel, semi-continuous reflectors that are interpreted to represent fine-grained turbidite deposits. The middle interval comprises low- to high-amplitude, semi-parallel, semi-continuous reflectors. These reflectors are interpreted to represent fine-grained mass transport deposits with interbedded channel sands. The reflectors within the lower interval of Unit 2 consist of low- to moderate-amplitude, parallel, continuous reflectors, and are interpreted to represent stratified silt- and clay-dominated turbidite deposits. At the Proposed Well GC584-C location, the upper interval of the unit is 199 feet thick and occurs between 223 feet and 422 feet BML (-4,339 feet to -4,538 feet MSL) and the middle portion of the unit is 758 feet thick and occurs between 422 feet and 1,180 feet BML (-4,538 feet to -5,296 feet MSL; Figure 9). The lower interval is 449 feet thick and occurs between 1,180 feet and 1,629 feet BML (-5,296 feet to -5,745 feet MSL; Figure 9). The base of the lower interval of Unit 2 is marked by Horizon 20.

There are no amplitude anomalies within 500 feet, and the likelihood of encountering shallow gas within this unit is interpreted to be negligible at the proposed well location (Figure 9).

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The GHSZ base falls within Unit 2 at 1,422 feet BML. The potential for encountering gas hydrates at the proposed well location above 1,422 feet BML (-5,538 feet MSL) is interpreted to be low (Figure 9). The likelihood of encountering gas hydrates below the depth for the GHSZ base is interpreted to be negligible.

The lack of interpreted sands within the upper and lower intervals results in a negligible potential for encountering SWF within these intervals. Due to interpreted sands within the middle interval, there is a low potential for a SWF (Figure 9).

Unit 3 (Horizon 20 to Horizon 30)

Unit 3 (Figure 7, Figure 8, and Figure 9) consists of low- to moderate-amplitude, semi-parallel, semi-continuous reflectors. The reflectors within Unit 3 are interpreted as clay- and silt-dominated turbidite deposits. The unit is 236 feet thick at the Proposed Well GC584-C location and occurs between 1,629 feet and 1,865 feet BML (-5,745 feet and -5,981 feet MSL; Figure 9).

There are no amplitude anomalies within 500 feet; therefore, the well is assigned a negligible potential for shallow gas (Figure 9).

Unit 3 is below the GHSZ base. The potential for encountering gas hydrates at the proposed well location is interpreted to be negligible (Figure 9).

No apparent sands are interpreted at the proposed location; therefore, the well is assigned a negligible potential for SWF (Figure 9).

Unit 4 (Horizon 30 to Horizon 40)

Unit 4 (Figure 7, Figure 8, and Figure 9) consists of low- to moderate-amplitude, parallel, continuous reflectors overlying low-amplitude, chaotic, semi-continuous to discontinuous reflectors. The sediments in the upper portion of Unit 4 are interpreted as stratified silt- and clay-dominated turbidite deposits, while the sediments in the lower portion of the unit are interpreted as silt- and clay-dominated channel deposits. At the Proposed Well GC584-C location, the upper part of the unit is 266 feet thick and will be encountered between 1,865 feet and 2,131 feet BML (-5,981 feet and -6,247 feet MSL); the lower part of the unit is 1,308 feet thick and occurs between 2,131 feet and 3,439 feet BML (-6,247 feet and -7,555 feet MSL; Figure 9).

There are no amplitude anomalies within 500 feet; therefore, the well is assigned a negligible potential for shallow gas (Figure 9).

Unit 4 is below the GHSZ base. The potential for encountering gas hydrates at the proposed well location is interpreted to be negligible (Figure 9).

No apparent sands are interpreted at the proposed location; therefore, the well is assigned a negligible potential for SWF (Figure 9).

Unit 5 (Horizon 40 to Horizon 50)

Unit 5 (Figure 7, Figure 8, and Figure 9) consists of low-amplitude, semi-parallel, semi-continuous reflectors. At the Proposed Well GC584-C location, the unit is 1,080 feet thick and occurs between 3,439 feet and 4,519 feet BML (-7,555 feet to -8,635 feet MSL; Figure 9). The sediments in Unit 5 are interpreted as coarse-grained turbidite deposits with interbedded coarse-grained MTDs.

There are no amplitude anomalies within 500 feet; therefore, there is a negligible potential for encountering shallow gas (Figure 9).

Unit 5 is below the GHSZ base. The potential for encountering gas hydrates at the proposed well location is interpreted to be negligible (Figure 9).

A low SWF potential is assessed for Unit 5 due to the possible presence of sands within the unit (Figure 9).

Unit 6 (Horizon 50 to DLI/6,500 feet BML)

Unit 6 (Figure 7, Figure 8, and Figure 9) consists of low-amplitude, semi-continuous, sub-parallel reflectors. The sediments in Unit 6 are interpreted as coarse-grained turbidites with interbedded sands. At the Proposed Well GC584-C location, the unit is 1,981 feet thick and occurs between 4,519 feet and 6,500 feet BML (-8,635 feet to -10,616 feet MSL; Figure 9).

There are no amplitude anomalies within 500 feet; therefore, there is a negligible potential for encountering shallow gas (Figure 9).

Unit 6 is below the GHSZ base. The potential for encountering gas hydrates at the proposed well location is interpreted to be negligible (Figure 9).

A low SWF potential is assessed for Unit 6 due to the possible presence of sands within the unit (Figure 9).

Faults

The proposed vertical wellbore will not encounter any faults in the shallow section (Figure 9).

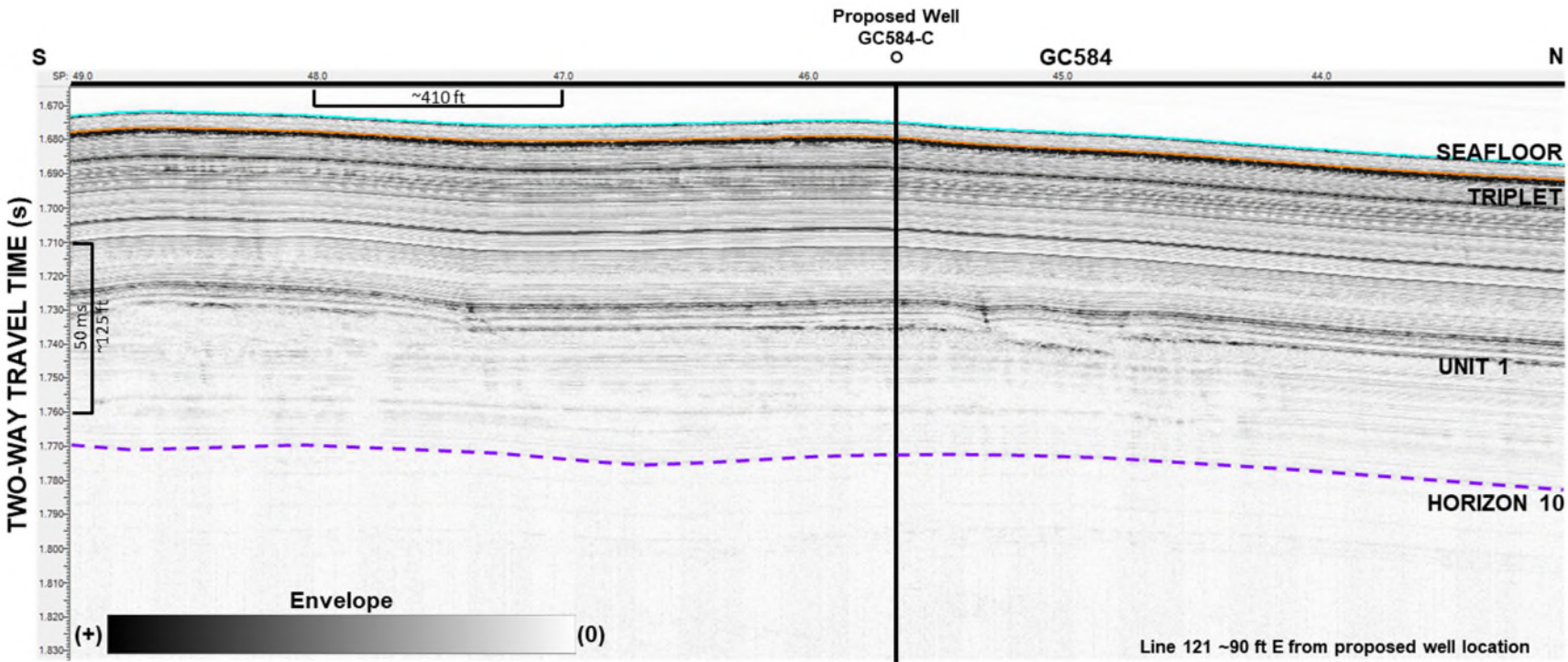


Figure 6. Portion of SBP Line 120 showing shallow stratigraphy at Proposed Well GC584-C.

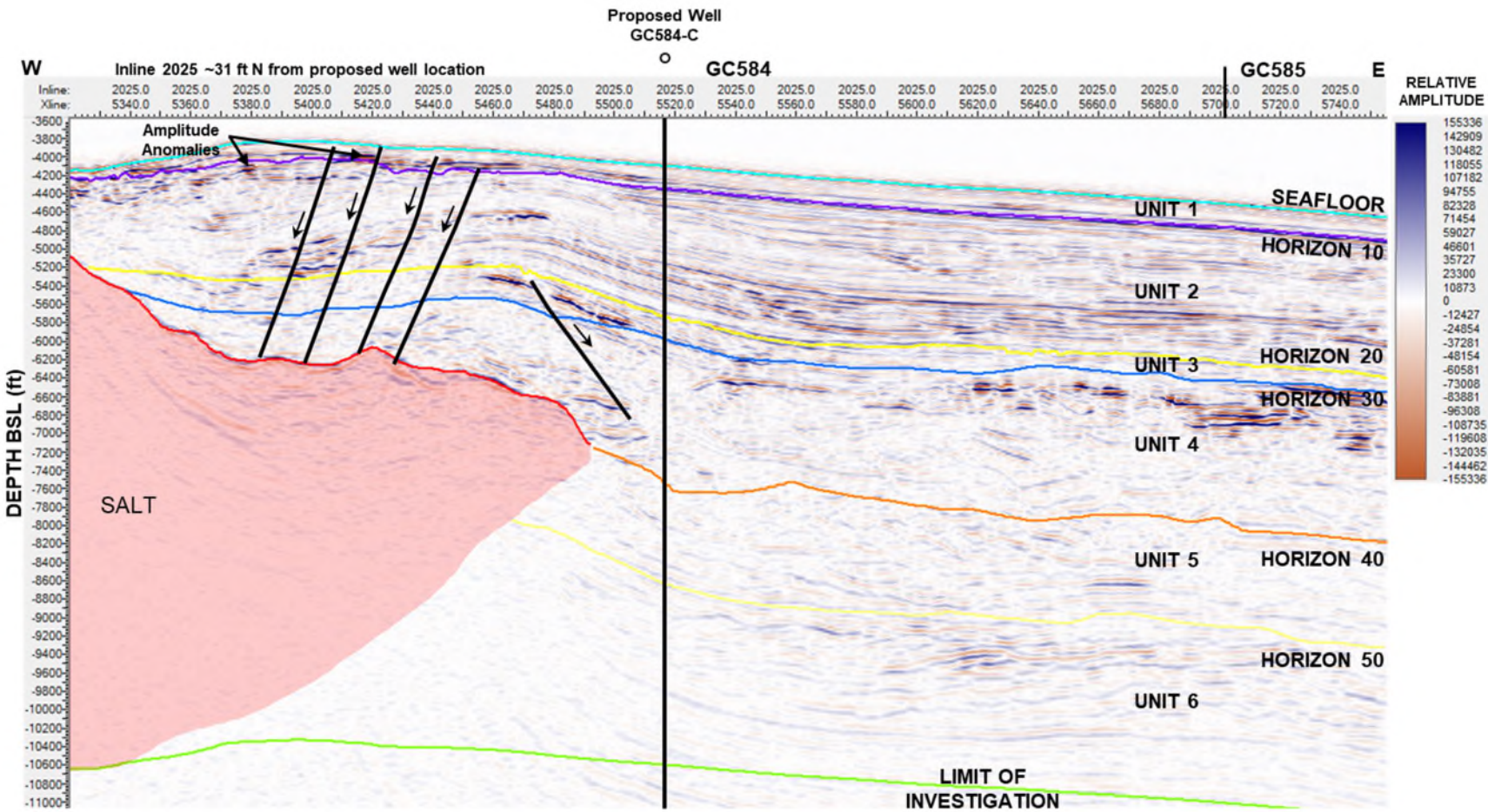


Figure 7. Portion of 3D seismic inline 2022 near Proposed Well GC584-C.

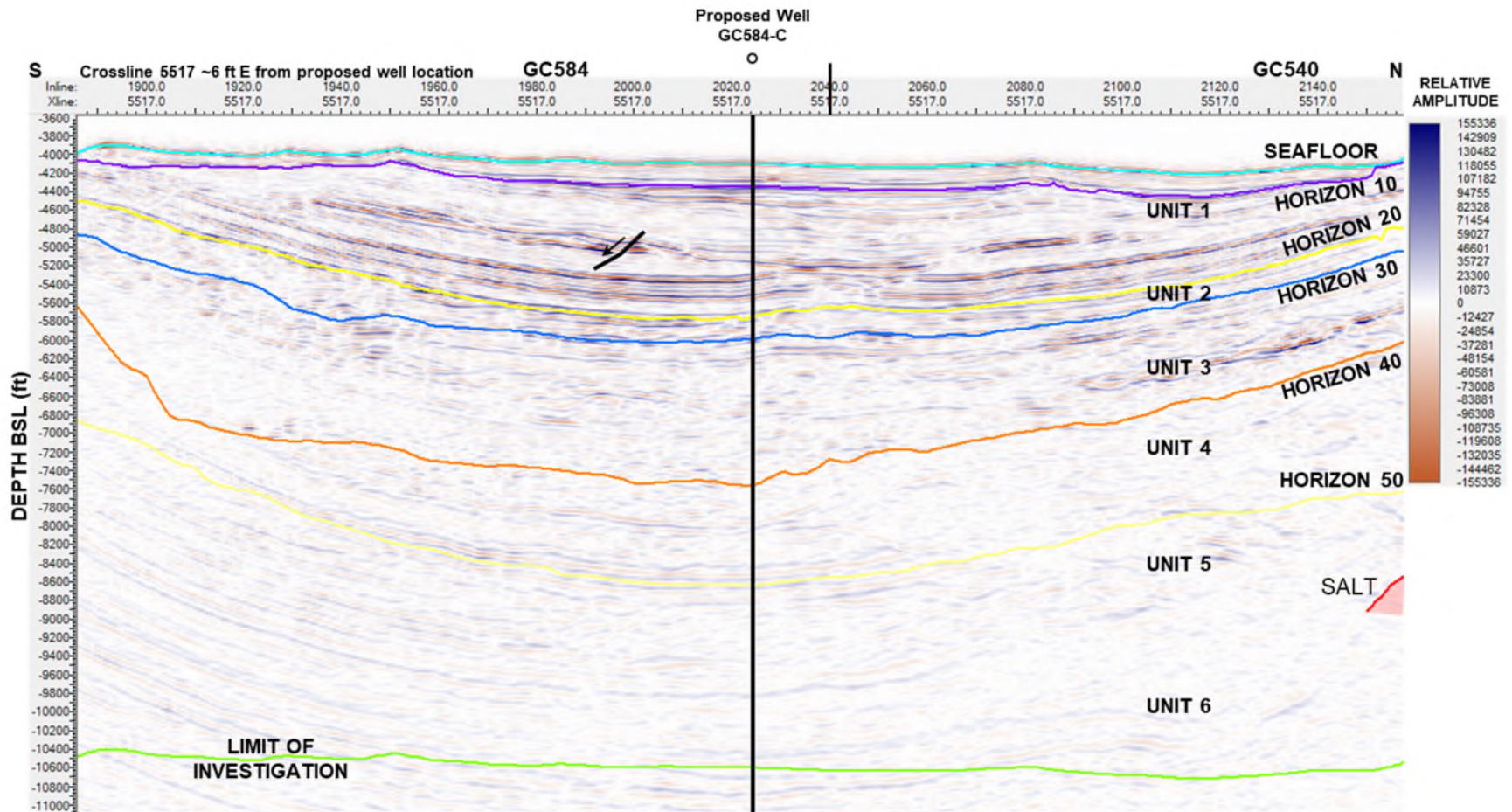
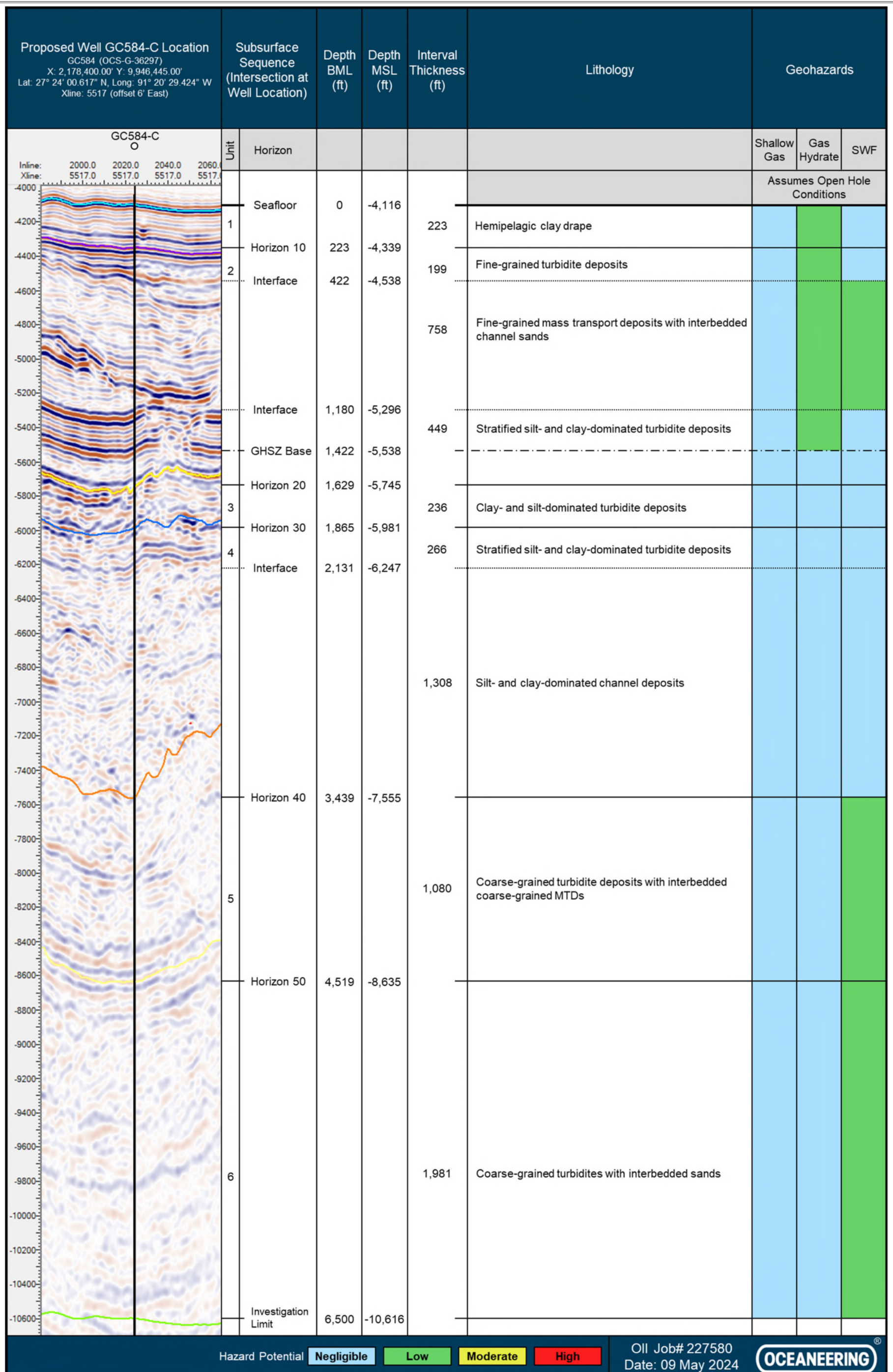


Figure 8. Portion of 3D seismic crossline 5517 near Proposed Well GC584-C.



Hazard Potential **Negligible** **Low** **Moderate** **High**

OII Job# 227580  
Date: 09 May 2024



Figure 9. Tophole Prognosis for Proposed Well GC584-C.

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## 7.0 CONCLUSIONS AND RECOMMENDATIONS

- The water depth at the Proposed Well GC584-C surface location is -4,116 feet MSL. The proposed wellsite is in an area of slightly undulating seafloor with a gradient of 4.6° to the east. No significant seafloor features that could interfere with drilling activities occur within 2,000 feet of the proposed wellsite.
- The low side scan sonar reflectivity and low backscatter intensity indicate fine-textured seafloor sediments within a 2,000-foot radius. There are no seafloor faults or any other seafloor features that may have adverse effects on drilling operations within 2,000 feet of the proposed wellsite.
- The review of AUV and 3D seismic data did not identify any potential high-density deepwater benthic community habitats within a 2,000-foot radius. Therefore, the potential impact to deepwater benthic communities during drilling operation is considered negligible.
- There was no existing infrastructure identified within 2,000 feet of the proposed well. There is one sonar contacts identified within 2,000 feet of the proposed well. This sonar contact is located 1,840 feet southwest of the proposed well location and has been assigned a standard 100-foot hazard avoidance.
- No amplitude anomalies were identified within 500 feet of the proposed well. Unit 1 through Unit 6 all have negligible potential for shallow gas.
- Above the depth limit of investigation (Horizon 6), the proposed well will not penetrate any faults or subsurface features that may have adverse effects to the drilling operations.
- Unit 1, the upper and lower intervals of Unit 2, Unit 3, and Unit 4 have negligible potential for SWF. The sandy intervals and sufficient depth for overpressured conditions in the remainder of the bore (middle interval of Unit 2, Unit 5, and Unit 6) exhibit a low potential for SWF. Closely monitoring the wellhead is recommended during connections and flow checks for SWF.
- There was no indication of gas hydrates, associated geologic features, or BSRs at the proposed wellsite. The calculated depth of the gas hydrate stability zone base is 1,422 feet BML. The proposed well is assessed a low potential for encountering gas hydrates above the GHSZ base and a negligible potential below the GHSZ base.

## 8.0 REFERENCES

Bureau of Ocean Energy Management, and Bureau of Safety and Environmental Enforcement, 2005. "Notice to Lessees and Operators of Federal Oil, Gas, and Sulphur Leases in the Outer Continental Shelf, Gulf of Mexico OCS Region: Archaeological Resource Surveys and Reports", U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico NTL No. 2005-G07.

Bureau of Ocean Energy Management, and Bureau of Safety and Environmental Enforcement, 2010. "Notice to Lessees and Operators of Federal Oil, Gas, and Sulphur Leases and Pipeline Right-of-Way Holders in the Outer Continental Shelf, Gulf of Mexico OCS Region: Deepwater Benthic Communities", U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico NTL No. 2009-G40.

Bureau of Ocean Energy Management, 2015. "Notice to Lessees and Operators of Federal Oil and Gas Leases in the Outer Continental Shelf, Gulf of Mexico OCS Region: Elimination of Expiration Dates on Certain Notices to Lessees and Operators Pending Review and Reissuance", U.S. Department of the Interior, Gulf of Mexico NTL No. 2015-N02.

Bureau of Ocean Energy Management, 2022. "Notice to Lessees and Operators of Federal Oil and Gas, and Sulphur Leases in the Gulf of Mexico Outer Continental Shelf (OCS) Region", U.S. Department of the Interior, Gulf of Mexico NTL No. 2022-G01.

Oceaneering International Inc, 2024. "Archaeological and Geohazard Assessment, Blocks 540 (OCS-G-37351) and 584 (OCS-G-36297), Green Canyon Area, Gulf of Mexico".

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**Appendix D: Wastes and Discharges Tables (Projected Generated Wastes and Projected Ocean Discharges)**

<b>Title of Document:</b>	Initial Exploration Plan – Far South	<b>Document Number:</b>	GM001-DR-PLN-600-00375730
<b>Authority:</b>	Brenda Linster	<b>Revision</b>	0
<b>Custodian/Owner:</b>	Adalberto Garcia	<b>Issue Date:</b>	06/11/2024
<b>Retention Code:</b>	ADM3000	<b>Next Review Date (if applicable):</b>	
<b>Security Classification:</b>		<b>Page:</b>	Page 33 of 40
<b>Warning: Check DW Docs revision to ensure you are using the correct revision.</b>			

**TABLE 1. ESTIMATED DRILLING AND MODU WASTES DISCHARGED OVERBOARD OFFSHORE GOM**

please specify if the amount reported is a total or per well amount

Surface Block #		GC584	NOI-PF#		TBD	Lat 27°23' 45.798" N		Long 91° 20' 32.641" W		
Project Name:		Far South			Projected ocean discharges					Projected Downhole Disposal ONSHORE
Basis: Estimated 145 Drilling Days (95 planned + high side NPT)										
All wells slotted to be drilled using Drilling Vessel - Black Hornet (DP drillship)										
Type of Waste	Composition	Projected Amount		Discharge Rate			Discharge	Answer yes or no		
<b>Drilling fluids for Exploration Permits (EP)</b>										
Water Based Drilling (WBM) Fluid	Spent drilling fluid drilling riserless hole plus pad mud to fill the hole	32,000 bbl/well		20	days @	1,600	bbl/day	Seafloor	No	
Drill Cuttings wetted with Water Based Fluid	Water base interval	5,000 bbl/well		20	days @	250	bbl/day	Seafloor	No	
Excess Cement Slurry	Excess mixed cement, including additives & waste from equipment wash down after a cement operation	200 bbl/well		7	cmt jobs @	28.57	bbl/cmt job	Surface	No	
Wet Drill Cuttings wetted with Synthetic Based Fluid	unaltered Drill Cuttings and adhering drilling fluid and formation oil carried out from the wellbore with the Drilling Fluid,	5,383 bbl/well		125	days @	43	bbl/day	Below Water Surface Line	No	
Dry Drill Cuttings	Dry Drill cuttings, cement cuttings, & synthetic base mud retained on cuttings residue remaining in the retort vessel after completing the retort procedure.	1,000 bbl/well		125	days @	8	bbl/day	Cutting Boxes	Yes	
Small Volume Drilling Fluid Discharges associated with Cuttings	Displaced interfaces, accumulated solids in sand traps, pit clean-out solids, & centrifuge discharges made while changing the mud weight	500 bbl/well		125	days @	4	bbl/day	Surface	No	
<b>Are Completion Drilling Fluids generated?</b>		NO								
Well Treatment Fluids	Stimulations fluids including acids, solvents & propping agents	0	bbl/well	0	events @	0	bbl/event	Surface	No	
Completion Fluids	Salt solutions, weighted brines, polymers, & various additives	0	bbl/well	0	events @	0	bbl/event	Surface	No	
Proppants	volume of Proppants to be added to Completion fluids	0	bbl/well	0	events @	0	bbl/event	Surface	No	
Radioactive Tracers	number of Tracers added to completion fluids	0	bb/well	0	events @	0	bbl/event	Surface	No	
Workover Fluids - If applicable	Salt solutions, weighted brines, polymers, & other speciality additives	0	bbl/well	0	events @	0	bbl/event	Surface	No	
<b>Will humans be there? If yes, expect conventional waste</b>										
Domestic Waste / Gray Water	Food waste, drainage from dishwasher, shower, laundry, bath, & washbasin drains	56,971 bbl/well		230	days @	248	bbl/day	Surface	No	
Sanitary Waste	Treated human body waste discharged from toilets & urinals	7,590 bbl/well		230	days @	33	bbl/day	Surface	No	
<b>Is there a deck? If yes, there will be Deck Drainage</b>										
Deck Drainage	Deck washdown & rain water	56,680 bbl/well		230	days @	286	bbl/day (avg)	Surface	No	
<b>Miscellaneous discharges. If yes, only fill in those associated with your activity.</b>										
Desalinization Unit Discharge	Wastewater associated with the process of creating freshwater from seawater	11,457,864 bbl/well		230	days @	49817	bbl/day	Surface	No	
Water Based Mud, Cuttings discharged at the Seafloor	Discharges of muds, cuttings, and cement at the seafloor before installation of the marine riser not listed above	0 bbl/well		1	events @	0.00	bbl/event	N/A	N/A	
Uncontaminated Ballast Water	Uncontaminated seawater added or removed to maintain proper draft I - no chemicals added for treatment	1,522,807 bbl/well		230	days @	6,621	bbl/day (avg)	Surface	No	
Uncontaminated Bilge Water	Uncontaminated seawater that collects in the lowest part of the vessel - no chemicals added for treatment	17,457 bbl/well		230	days @	76	bbl/day (avg)	Surface	N/A	
Cement (including cement trace) discharged at seafloor	discharges that occur at the seafloor prior to installation of the marine riser and during marine riser disconnect, well abandonment and plugging operations.	1,378 bbl/well		2	event @	689	bbl/day	Seafloor	No	
Fire Water	Uncontaminated seawater/freshwater used for fire control I - no chemicals added for treatment	0 bbl/well		230	days @	0	bbl/week	Surface	No	
Cooling Water / Utility Water	Uncontaminated seawater	251,301,611 bbl/well		230	days @	1,092,616	bbl/day	Surface	No	
Chemically Treated Sea Water / Fresh Water	Biocide, corrosion inhibitors, or other chemicals used to prevent corrosion or fouling of drilling fluids piping or auxiliary equipment	1,000 bbl/well		1,000	event @	1000	bbl/event	Surface	No	
Sub Sea Fluid Discharges	Wellhead Preservation, Hydrate Control, Umbilical Steel Tube Storage, Leak Tracer, & Riser Tensioner Fluids	10 bbl/well		10	event @	10	bbl/event	Seafloor	N/A	
Brine and water-based mud discharge at the seafloor for temporary well abandonment	Water based Drilling fluids meets SPP Toxicity and brine that has met limits for free oil, oil and grease concentrations, priority pollutants and toxicity requirements	2,500 bbl/well		2,500	event @	2500	bbl/event	Seafloor	N/A	
Blowout Preventer Fluid - BOP Vent to sea systems only	Fluid used to actuate the hydraulic equipment on the BOP (Eirifron 360HD 3% - 97% water)	100 bbl/well		2	event @	2	bbl/event	Seafloor	N/A	
<b>Will you produce hydrocarbons? If yes fill in for produced water.</b>										
Produced Water	Water brought up from hydrocarbon-bearing strata during extraction of oil & gas	0 bbl/well		230	days @	4,037	bbl/day	Surface	N/A	
<b>BP General NPDES permit Number ?</b>		GMG290110								

# WASTE TABLE FOR DRILL SHIPS

**TABLE 2. WASTES YOU WILL TRANSPORT AND /OR DISPOSE OF ONSHORE**

Please specify whether the amount reported is a total or per well		Number of operational days: 230		Asset Name: Black Hornet		
Well Name: Far South	Projected generated waste	Solid and Liquid Wastes transportation		Waste Disposal		
Type of Waste	Composition	Transport Method	Name/Location of Facility	Quantity	Units	Disposal Method
<b>Will drilling occur? If yes, fill in the muds and cuttings.</b>						
Unused Synthetic-based drilling fluid	SBM from service - has not been downhole	Liquid mud storage on workboat	Baroid / MI Swaco Fouchon LA			For Reclamation & re-use
Synthetic-based drilling mud solids and barite	SBM and barite from pit cleanout	Barged in (15 or 25 barrel cutting boxes)	Ecoserv / R360 Fouchon, LA	552	bbbls/well	Landfill/ Deepwell injection on land
Contaminated Synthetic base mud	SBM interface	Barged in (15 or 25 barrel cutting boxes)	Ecoserv / R360, Fouchon, LA		bbbls/well	Landfill/ Deepwell injection on land
Used Synthetic base mud - from downhole	SBM from downhole - sent in to vendor for reuse	Liquid mud storage on workboat	Baroid / MI Swaco Fouchon LA			For Reclamation & re-use
Drilling mud contaminated absorbents	Absorbent pads contaminated with drilling muds	Barged in (Omega 2 yard boxes)	Omega Waste Management, Patterson, LA		tons/well	Recycle
Excess barite	Excess barite from vessel tank cleaning	Barged in (supersacks)	River Birch Landfill, Avondale, LA		tons/well	Reuse / Landfill
Excess cement	Excess cement from vessel tank cleaning	Barged in (supersacks)	River Birch Landfill, Avondale, LA	18.4	tons/well	Reuse / Landfill
Rig Drilling washwater	Cleaning out of mud tanks	Barged in (15 or 25 barrel cutting boxes)	Ecoserv / R360, Fouchon LA	3427	bbbls/well	Landfill/ Deepwell injection on land
Contaminated Completion Fluids	Used Completion fluids	Barged in (15 or 25 barrel cutting boxes)	Ecoserv / R360 Fouchon LA		bbbls/well	Landfill/ Deepwell injection on land
Completion Fluids	Used Completion fluids	Liquid storage tanks on workboat	Ecoserv / MI Swaco Fouchon LA		bbbls/well	Landfill/ Deepwell injection on land
<b>Will you produce hydrocarbons? If yes fill in for produced sand.</b>						
<b>Will you have additional wastes that are not permitted for discharge? If yes, fill in the appropriate rows.</b>						
Well Related Hazardous Waste	Rig lab titrations containing isopropanol alcohol, silver nitrate etc.	Barged in (5 gallon DOT containers)	Chemical Waste Management, Sulphur, LA	0.138	ton/well	Incineration / Landfill
Rig Maintenance Wastes (painting, blasting)	Paint thinner, paint chips, blast media, aerosol cans	Barged in (drums or totes)	River Birch Landfill, Avondale, LA and Chemical Waste Management, Sulphur, LA	69	ton/well	Incineration / Landfill
Rig Maintenance Wastes (non hazardous)	Oily rags, pads, oil filters etc.	Barged in (totes)	Omega Waste Management, Patterson, LA	32.2	ton/well	Reuse / Landfill
Rig Used oil	Lube oil, hydraulic oil, glycol	Barged in (drums)	Omega Waste Management, Patterson, LA	13.8	bbbls/well	Recycle
Domestic waste	Municipal trash	Barged in (supersacks)	River Birch Landfill, Avondale, LA	5.75	ton/well	Incineration / Landfill
Scrap Metal	scrap piping, grating and other metals	Barged in (scrap baskets)	Southern Scrap, Houma, LA	52.9	ton/well	Recycle
Universal Waste	Batteries	Barged in (DOT drums)	LEI, Hammond, LA	0.92	ton/well	Recycle
Universal Waste	Fluorescent light bulbs	Barged in (DOT drums)	LEI, Hammond, LA	0.23	ton/well	Recycle
Misc. unused chemical	Pills, spacers, additives etc.	Barged in (totes)	River Birch Landfill, Avondale, LA	782	bbbls/well	Recycle
Oily water	Washwater rig equipment	Transported in (15 barrel cuttings boxes)	Omega Waste Management, Patterson, LA	264.5	bbbls/well	Recycle
Recycled materials	Plastic, paper, aluminum	Barged in (supersacks)	RTG/Hoover Ferguson, Iberia, LA	6.9	ton/well	Recycle

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**Appendix E: Air Emissions Information – Form BOEM-0138**

<b>Title of Document:</b>	Initial Exploration Plan – Far South	<b>Document Number:</b>	GM001-DR-PLN-600-00375730
<b>Authority:</b>	Brenda Linster	<b>Revision</b>	0
<b>Custodian/Owner:</b>	Adalberto Garcia	<b>Issue Date:</b>	06/11/2024
<b>Retention Code:</b>	ADM3000	<b>Next Review Date (if applicable):</b>	
<b>Security Classification:</b>		<b>Page:</b>	Page 34 of 40
<b>Warning: Check DW Docs revision to ensure you are using the correct revision.</b>			

EP - AIR QUALITY

OMB Control No. 1010-0151  
 OMB Approval Expires: 08/31/2023

<b>COMPANY</b>	BP Exploration & Production Inc.
<b>AREA</b>	Green Canyon
<b>BLOCK</b>	GC 584
<b>LEASE</b>	OCS-G36297
<b>FACILITY</b>	Not Applicable
<b>WELL</b>	GC584-1 "A", "B", "C", "D"
<b>COMPANY CONTACT</b>	Ramesh Gopal (Air Quality Review)/ Adalberto Garcia (Plans)
<b>TELEPHONE NO.</b>	Ramesh Gopal (409-655-4418) / Adalberto Garcia (281-995-2815)
<b>REMARKS</b>	Drill one well and sidetrack

**AIR EMISSIONS COMPUTATION FACTORS**

Fuel Usage Conversion Factors	Natural Gas Turbines			Natural Gas Engines			Diesel Recip. Engine		Diesel Turbines		REF.	DATE
	SCF/hp-hr		9.524	SCF/hp-hr	7.143		GAL/hp-hr	0.0514	GAL/hp-hr	0.0514		
Equipment/Emission Factors	units	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3		
Natural Gas Turbine	g/hp-hr		0.0086	0.0086	0.0026	1.4515	0.0095	N/A	0.3719	N/A	AP42 3.1-1& 3.1-2a	4/00
RECIP. 2 Cycle Lean Natural Gas	g/hp-hr	0.1293	0.1293	0.1293	0.0020	6.5995	0.4082	N/A	1.2009	N/A	AP42 3.2-1	7/00
RECIP. 4 Cycle Lean Natural Gas	g/hp-hr	0.0002	0.0002	0.0002	0.0020	2.8814	0.4014	N/A	1.8949	N/A	AP42 3.2-2	7/00
RECIP. 4 Cycle Rich Natural Gas	g/hp-hr	0.0323	0.0323	0.0323	0.0020	7.7224	0.1021	N/A	11.9408	N/A	AP42 3.2-3	7/00
Diesel Recip. < 600 hp	g/hp-hr	1	1	1	0.0279	14.1	1.04	N/A	3.03	N/A	AP42 3.3-1	10/96
Diesel Recip. > 600 hp	g/hp-hr	0.32	0.182	0.178	0.0055	10.9	0.29	N/A	2.5	N/A	AP42 3.4-1 & 3.4-2	10/96
Diesel Boiler	lbs/bbl	0.0840	0.0420	0.0105	0.0099	1.0080	0.0084	5.14E-05	0.2100	0.0336	AP42 1.3-6; Pb and NH3; WebFIRE (08/2018)	9/98 and 5/10
Diesel Turbine	g/hp-hr	0.0381	0.0137	0.0137	0.0048	2.7941	0.0013	4.45E-05	0.0105	N/A	AP42 3.1-1 & 3.1-2a	4/00
Dual Fuel Turbine	g/hp-hr	0.0381	0.0137	0.0137	0.0048	2.7941	0.0095	4.45E-05	0.3719	0.0000	AP42 3.1-1 & 3.1-2a; AP42 3.1-1 & 3.1-2a	4/00
Vessels - Propulsion	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NELTSP refer to Diesel Recip. > 600 hp reference	3/19
Vessels - Drilling Prime Engine, Auxiliary	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NELTSP refer to Diesel Recip. > 600 hp reference	3/19
Vessels - Diesel Boiler	g/hp-hr	0.0466	0.1491	0.1417	0.0400	1.4914	0.0820	3.73E-05	0.1491	0.0003	USEPA 2017 NELTSP (units converted) refer to Diesel Boiler Reference	3/19
Vessels - Well Stimulation	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NELTSP refer to Diesel Recip. > 600 hp reference	3/19
Natural Gas Heater/Boiler/Burner	lbs/MMscf	7.60	1.90	1.90	0.60	190.00	5.50	5.00E-04	84.00	3.2	AP42 1.4-1 & 1.4-2; Pb and NH3; WebFIRE (08/2018)	7/98 and 8/18
Combustion Flare (no smoke)	lbs/MMscf	0.00	0.00	0.00	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2	2/18
Combustion Flare (light smoke)	lbs/MMscf	2.10	2.10	2.10	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2	2/18
Combustion Flare (medium smoke)	lbs/MMscf	10.50	10.50	10.50	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2	2/18
Combustion Flare (heavy smoke)	lbs/MMscf	21.00	21.00	21.00	0.57	71.40	35.93	N/A	325.5	N/A	AP42 13.5-1, 13.5-2	2/18
Liquid Flaring	lbs/bbl	0.42	0.0966	0.0651	5.964	0.84	0.01428	5.14E-05	0.21	0.0336	AP42 1.3-1 through 1.3-3 and 1.3-5	5/10
Storage Tank	tons/yr/tank						4.300				2014 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)	2017
Fugitives	lbs/hr/component						0.0005				API Study	12/93
Glycol Dehydrator	tons/yr/dehydrator						19.240				2011 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)	2014
Cold Vent	tons/yr/vent						44.747				2014 Gulfwide Inventory; Avg emiss (upper bound of 95% CI)	2017
Waste Incinerator	lb/ton		15.0	15.0	2.5	2.0	N/A	N/A	20.0	N/A	AP 42 2.1-12	10/96
On-Ice - Loader	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009
On-Ice - Other Construction Equipment	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009
On-Ice - Other Survey Equipment	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009
On-Ice - Tractor	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009
On-Ice - Truck (for gravel island)	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009
On-Ice - Truck (for surveys)	lbs/gal	0.043	0.043	0.043	0.040	0.604	0.049	N/A	0.130	0.003	USEPA NONROAD2008 model; TSP (units converted) refer to Diesel Recip. <600 reference	2009
Man Camp - Operation (max people/day)	tons/person/day		0.0004	0.0004	0.0004	0.006	0.001	N/A	0.001	N/A	BOEM 2014-1001	2014
Vessels - Ice Management Diesel	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NELTSP refer to Diesel Recip. > 600 hp reference	3/19
Vessels - Hovercraft Diesel	g/hp-hr	0.320	0.1931	0.1873	0.0047	7.6669	0.2204	2.24E-05	1.2025	0.0022	USEPA 2017 NELTSP refer to Diesel Recip. > 600 hp reference	3/19

Sulfur Content Source	Value	Units
Fuel Gas	3.38	ppm
Diesel Fuel	0.0015	% weight
Produced Gas (Flare)	3.38	ppm
Produced Oil (Liquid Flaring)	1	% weight

Density and Heat Value of Diesel Fuel		
Density	7.05	lbs/gal
Heat Value	19,300	Btu/lb

Heat Value of Natural Gas		
Heat Value	1,050	MMBtu/MMscf

Natural Gas Flare Parameters	Value	Units
VOC Content of Flare Gas	0.6816	lb VOC/lb-mol gas
Natural Gas Flare Efficiency	98	%

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS																		
BP Exploration & Production Inc.	Green Canyon	GC 584	OCS-G36297	Not Applicable	GC584-1 "A", "B", "C", "D"	Ramesh Gopal (Air Quality Review)	Ramesh Gopal (409-655-4418) / Ag	Drill one well and sidetrack																		
OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	MAX. FUEL	ACT. FUEL	MAXIMUM POUNDS PER HOUR											ESTIMATED TONS									
	Diesel Engines		HP	GAL/HR	GAL/D																					
	Nat. Gas Engines		HP	SCF/HR	SCF/D																					
	Burners		MMBTU/HR	SCF/HR	SCF/D	HR/D	D/YR	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3	
<b>DRILLING - Black Hornet</b> (Substitution likely with similar drillship/DP Semi-submersibles of same or lower horsepower)	<b>Average Daily Fuel Usage</b> <b>Maximum Daily Fuel Usage</b>				13210 34818																					
Main Engines: Hyundai Himsen 9H32/40 and 18H32/40V	VESSELS- Drilling - Propulsion Engine - Diesel		60354	3104.9719	34818.00	24	150	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	35.81	21.60	20.96	0.52	857.96	24.67	0.00	134.57	0.25	
Egen: Cummins 1900 kW	Vessels - Drilling Prime Engine, Auxiliary		2458	126.45427	3034.90	2	22	1.73	1.05	1.01	0.03	41.55	1.19	0.00	6.52	0.01	0.04	0.02	0.02	1.19	0.00	0.91	0.03	0.00	0.14	0.00
Temporary Large/ Small Auxiliary Engines	Vessels - Drilling Prime Engine, Auxiliary		2500	128.615	3086.76	24	150	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	3.17	1.92	1.86	0.05	76.06	2.19	0.00	11.93	0.02	
			BPD																							
<b>2024 Facility Total Emissions</b>								<b>46.08</b>	<b>27.80</b>	<b>26.96</b>	<b>0.67</b>	<b>1,103.95</b>	<b>31.74</b>	<b>0.00</b>	<b>173.15</b>	<b>0.32</b>	<b>39.02</b>	<b>23.54</b>	<b>22.84</b>	<b>0.57</b>	<b>934.94</b>	<b>26.88</b>	<b>0.00</b>	<b>146.64</b>	<b>0.27</b>	
<b>EXEMPTION CALCULATION</b>	<b>DISTANCE FROM LAND IN MILES</b>																<b>3,896.10</b>			<b>3,896.10</b>	<b>3,896.10</b>	<b>3,896.10</b>		<b>81,333.51</b>		
	117.0																									
<b>DRILLING</b>	VESSELS - Supply Diesel		7200	370.4112	8889.87	24	150	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	9.14	5.52	5.35	0.13	219.06	6.30	0.00	34.36	0.06	
	VESSELS - Supply Diesel		7200	370.4112	8889.87	24	75	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	4.57	2.76	2.68	0.07	109.53	3.15	0.00	17.18	0.03	
	VESSELS - Supply Diesel		7200	370.4112	8889.87	24	75	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	4.57	2.76	2.68	0.07	109.53	3.15	0.00	17.18	0.03	
<b>2024 Non-Facility Total Emissions</b>								<b>15.24</b>	<b>9.19</b>	<b>8.92</b>	<b>0.22</b>	<b>365.10</b>	<b>10.50</b>	<b>0.00</b>	<b>57.26</b>	<b>0.11</b>	<b>18.29</b>	<b>11.03</b>	<b>10.70</b>	<b>0.27</b>	<b>438.12</b>	<b>12.60</b>	<b>0.00</b>	<b>68.72</b>	<b>0.13</b>	

AIR EMISSIONS CALCULATIONS - 1ST YEAR

COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL	CONTACT	PHONE	REMARKS																	
BP Exploration & Production Inc.	Green Canyon	GC 584	OCS-G36297	Not Applicable	GC584-1 "A", "B", "C", "D"	Ramesh Gopal (Air Quality Review)	Ramesh Gopal (409-655-4418) /A	Drill one well and sidetrack																	
OPERATIONS	EQUIPMENT	EQUIPMENT ID	RATING	MAX. FUEL	ACT. FUEL	RUN TIME	MAXIMUM POUNDS PER HOUR										ESTIMATED TONS								
	Diesel Engines		HP	GAL/HR	GAL/D		TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3	
	Nat. Gas Engines		HP	SCF/HR	SCF/D																				
	Burners		MMBTU/HR	SCF/HR	SCF/D	HR/D	D/YR																		
<b>DRILLING - Black Hornet</b> (Substitution likely with similar drills/DP Semi-submersibles of same or lower horsepower)	Average Daily Fuel Usage				13210																				
	Maximum Daily Fuel Usage				34818																				
Main Engines: Hyundai Himsen 9H32	VESSELS- Drilling - Propulsion Engine - Diesel		60354	3104.97	34818.00	24	300	42.58	25.69	24.92	0.62	1020.15	29.33	0.00	160.01	0.30	71.62	43.21	41.91	1.04	1715.93	49.34	0.01	269.14	0.50
Egen: Cummins 1900 kW	Vessels - Drilling Prime Engine, Auxiliary		2458	126.45	3034.90	2	43	1.73	1.05	1.01	0.03	41.55	1.19	0.00	6.52	0.01	0.07	0.04	0.04	0.00	1.79	0.05	0.00	0.28	0.00
Temporary Large/ Small Auxiliary En	Vessels - Drilling Prime Engine, Auxiliary		2500	128.62	3086.76	24	300	1.76	1.06	1.03	0.03	42.26	1.21	0.00	6.63	0.01	6.35	3.83	3.72	0.09	152.12	4.37	0.00	23.86	0.04
			BPD																						
<b>2025 Facility Total Emissions</b>								<b>46.08</b>	<b>27.80</b>	<b>26.96</b>	<b>0.67</b>	<b>1,103.95</b>	<b>31.74</b>	<b>0.00</b>	<b>173.15</b>	<b>0.32</b>	<b>78.04</b>	<b>47.09</b>	<b>45.67</b>	<b>1.14</b>	<b>1,869.84</b>	<b>53.76</b>	<b>0.01</b>	<b>293.28</b>	<b>0.55</b>
<b>EXEMPTION CALCULATION</b>	<b>DISTANCE FROM LAND IN MILES</b>																<b>3,896.10</b>			<b>3,896.10</b>	<b>3,896.10</b>	<b>3,896.10</b>		<b>81,333.51</b>	
	117.0																								
DRILLING	VESSELS - Supply Diesel		7200	370.4112	8889.87	24	300	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	18.29	11.03	10.70	0.27	438.12	12.60	0.00	68.72	0.13
	VESSELS - Supply Diesel		7200	370.4112	8889.87	24	150	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	9.14	5.52	5.35	0.13	219.06	6.30	0.00	34.36	0.06
	VESSELS - Supply Diesel		7200	370.4112	8889.87	24	150	5.08	3.06	2.97	0.07	121.70	3.50	0.00	19.09	0.04	9.14	5.52	5.35	0.13	219.06	6.30	0.00	34.36	0.06
<b>2025 Non-Facility Total Emissions</b>								<b>15.24</b>	<b>9.19</b>	<b>8.92</b>	<b>0.22</b>	<b>365.10</b>	<b>10.50</b>	<b>0.00</b>	<b>57.26</b>	<b>0.11</b>	<b>36.57</b>	<b>22.06</b>	<b>21.40</b>	<b>0.53</b>	<b>876.24</b>	<b>25.19</b>	<b>0.00</b>	<b>137.44</b>	<b>0.26</b>

### AIR EMISSIONS CALCULATIONS

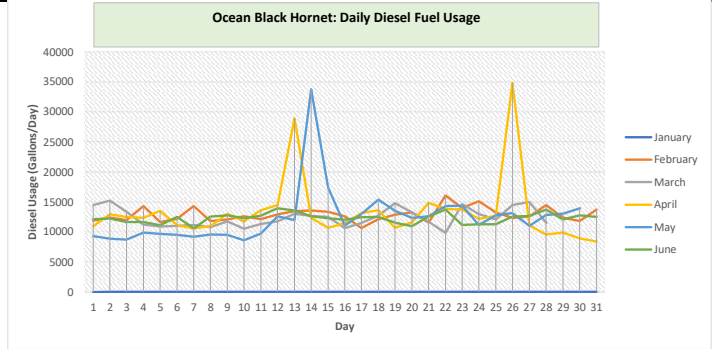
COMPANY	AREA	BLOCK	LEASE	FACILITY	WELL	
BP Exploration & Production Inc.	Green Canyon	GC 584	OCS-G36297	Not Applicable	GC584-1 "A", "B", "C", "D"	

Year	Facility Emitted Substance								
	TSP	PM10	PM2.5	SOx	NOx	VOC	Pb	CO	NH3
<b>2024</b>	<b>39.02</b>	<b>23.54</b>	<b>22.84</b>	<b>0.57</b>	<b>934.94</b>	<b>26.88</b>	<b>0.00</b>	<b>146.64</b>	<b>0.27</b>
<b>2025</b>	<b>78.04</b>	<b>47.09</b>	<b>45.67</b>	<b>1.14</b>	<b>1869.84</b>	<b>53.76</b>	<b>0.01</b>	<b>293.28</b>	<b>0.55</b>
<b>Allowable</b>	<b>3896.10</b>			<b>3896.10</b>	<b>3896.10</b>	<b>3896.10</b>		<b>81333.51</b>	

**OCEAN BLACK HORNET ACTUAL FUEL USAGE (JANUARY - JUNE 2019)**

Day	January		February		March		April		May		June	
	Cubic Meter	Gallons	Cubic Meters	Gallons	Cubic Meters	Gallons	Cubic Meters	Gallons	Cubic Meters	Gallons	Cubic Meters	Gallons
1	44.9	11861	54.6	14424	41.4	10937	35.1	9272	45.8	12099	47.7	12601
2	46.9	12390	57.7	15243	48.9	12918	33.5	8850	46.2	12205	43.5	11491
3	45.3	11967	50.5	13341	47.2	12469	32.9	8691	44.1	11650	39.1	10329
4	54	14265	42.3	11174	46.7	12337	37.3	9854	44	11624	39.1	10329
5	44	11624	41.1	10857	51.1	13499	36.6	9669	41.9	11069	41.4	10937
6	46.1	12178	41.5	10963	42	11095	36	9510	47.3	12495	41.2	10884
7	54.1	14292	42.1	11122	40	10567	34.8	9193	40.1	10593	50.6	13367
8	44.6	11782	40.7	10752	41.4	10937	36.2	9563	47.4	12522	46.8	12363
9	45.7	12073	44.5	11756	49.2	12997	36	9510	48.3	12760	41.7	11016
10	47.7	12601	39.8	10514	44.4	11729	32.5	8586	46.5	12284	46	12152
11	45.9	12125	42.8	11307	51.5	13605	36.7	9695	48.1	12707	40.8	10778
12	48.8	12892	44.4	11729	54.8	14477	47.6	12575	52.7	13922	41	10831
13	50.8	13420	49.3	13024	109.3	28874	45.3	11967	51.3	13552	43.3	11439
14	51.2	13526	47.8	12627	46.6	12310	127.9	33788	47.6	12575	46.1	12178
15	50.5	13341	47.2	12469	40.3	10646	65.8	17383	46.4	12258	41.7	11016
16	47.6	12575	40.1	10593	43.2	11412	41.7	11016	45.5	12020	50.3	13288
17	40.3	10646	43.4	11465	49.7	13129	49.1	12971	47.1	12443	54.6	14424
18	45.9	12125	48.1	12707	51.4	13578	58.2	15375	47.2	12469	45.9	12125
19	48.7	12865	56	14794	40.4	10673	51.1	13499	43.7	11544	52.5	13869
20	50.1	13235	50	13209	43.8	11571	46.7	12337	41.3	10910	53	14001
21	43.6	11518	44.2	11676	56.1	14820	47.7	12601	47.4	12522	49.9	13182
22	60.9	16088	37.3	9854	52.2	13790	54.1	14292	51.8	13684	56	14794
23	52.8	13948	55.3	14609	51.9	13711	54.2	14318	42.2	11148	55	14529
24	57.1	15084	49.1	12971	46	12152	42.2	11148	42.5	11227	44.5	11756
25	50.1	13235	45.6	12046	47.9	12654	48.3	12760	42.5	11227	51.3	13552
26	46.6	12310	54.6	14424	131.8	34818	49.6	13103	47.4	12522	55.7	14714
27	47.5	12548	56.8	15005	42	11095	41.5	10963	47.8	12627	56.1	14820
28	54.6	14424	43.4	11465	36.2	9563	48.5	12812	51.9	13711	48	12680
29	46.8	12363			37.3	9854	49.3	13024	45.7	12073	45.8	12099
30	44.6	11782			33.7	8903	52.6	13895	48.3	12760	48.8	12892
31	51.8	13684			31.7	8374			47.3	12495		
<b>Total</b>	<b>1509.5</b>	<b>398768</b>	<b>1310.2</b>	<b>346118</b>	<b>1550.1</b>	<b>409493</b>	<b>1409</b>	<b>372218</b>	<b>1437.3</b>	<b>379694</b>	<b>1417.4</b>	<b>374437</b>
<b>Average</b>	<b>49</b>	<b>12864</b>	<b>47</b>	<b>12362</b>	<b>51</b>	<b>13210</b>	<b>47</b>	<b>12408</b>	<b>47</b>	<b>12249</b>	<b>48</b>	<b>12482</b>
<b>Maximum</b>	<b>60.9</b>	<b>16088</b>	<b>57.7</b>	<b>15243</b>	<b>131.8</b>	<b>34818</b>	<b>127.9</b>	<b>33788</b>	<b>52.7</b>	<b>13922</b>	<b>56.1</b>	<b>14820</b>

Average Daily Fuel Usage Rate = **13210 gals/day**  
 Maximum Daily Fuel Usage Rate = **34818 gals/day**



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**Appendix F: WCD Modeling Report - Found in Proprietary Copy of EP**

<b>Title of Document:</b>	Initial Exploration Plan – Far South	<b>Document Number:</b>	GM001-DR-PLN-600-00375730
<b>Authority:</b>	Brenda Linster	<b>Revision</b>	0
<b>Custodian/Owner:</b>	Adalberto Garcia	<b>Issue Date:</b>	06/11/2024
<b>Retention Code:</b>	ADM3000	<b>Next Review Date (if applicable):</b>	
<b>Security Classification:</b>		<b>Page:</b>	Page 35 of 40
<b>Warning: Check DW Docs revision to ensure you are using the correct revision.</b>			

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## Appendix G: Oil Spill Response Discussion -

<b>Title of Document:</b>	Initial Exploration Plan – Far South	<b>Document Number:</b>	GM001-DR-PLN-600-00375730
<b>Authority:</b>	Brenda Linster	<b>Revision</b>	0
<b>Custodian/Owner:</b>	Adalberto Garcia	<b>Issue Date:</b>	06/11/2024
<b>Retention Code:</b>	ADM3000	<b>Next Review Date (if applicable):</b>	
<b>Security Classification:</b>		<b>Page:</b>	Page 36 of 40
<b>Warning: Check DW Docs revision to ensure you are using the correct revision.</b>			

SPILL RESPONSE DISCUSSION

1) Worst Case Discharge Scenario

Under this Initial Exploration Plan for the Far South prospect, BP Exploration & Production Inc. (BP) proposes to drill two wells with surface locations and bottomhole locations in Green Canyon Block 584. The primary well locations 'A' and 'C' have alternate mirror locations 'B' and 'D', respectively, which are included only for re-spud purposes. These mirror locations ('B' and 'D') ultimately target the same production horizon and will encounter the same sands on the path to the targeted bottom-hole locations as their respective primary 'A' and 'C' well locations.

The uncontrolled blowout scenario is for a potential blowout of the Well Location 'C', which BP calculates has the highest liquid hydrocarbons rate potential in the Green Canyon (GC) 584 area. The blowout scenario assumes that the pipe has been tripped out of the hole when a problem with the wellhead connector develops, resulting in the removal of the BOP stack. Due to the loss of riser margin, the well flows unrestricted and worst case discharge (WCD) is approximately 180,000 stbopd, with the calculation support package for this rate attached in the Proprietary Information copy of the Exploration Plan. The maximum duration of the blowout is estimated at 70 days. The rate profile associated with the well blowout over this 70-day period results in a potential worst case spill volume estimated at 10.5 mmstbo.

2) Facility Information:

- Type of Operation: Drilling
- Facility Name/Well Name: Far South / 'C'
- Area and Block: Green Canyon Block 584
- Latitude: 27° 24 00.617" N
- Longitude: 091° 20' 29.424" W
- Distance to Shore: 117 statute miles
- Water Depth: 4,116
- API Gravity: 25.6°

3) Worst Case Discharge Volume

Description	Barrels of Oil
24 hour uncontrolled blowout	180,000 bbls

Oil spill response-related activities for wells to be drilled under BP's EP are governed by the BP Regional Oil Spill Response Plan (OSRP). The OSRP was filed on behalf of several BP companies, including BP Exploration & Production Inc. (Operator No. 02481) and approved by BSEE on November 29, 2022. The BP OSRP should meet the requirements contained in 30 CFR Part 254. BP (Operator No. 02481) has demonstrated oil spill financial responsibility for the facilities proposed in this EP, according to 30 CFR Part 553 and NTL No. 2008-N05, "Guidelines for Oil Spill Financial Responsibility for Covered Facilities." The OSRP details BP's plan for response to manage oil spills that may result from drilling and production operations. BP has designed its response program based on a regional capability of response to spills ranging from small operations-related spills to a worst-case discharge (WCD) from a well blowout. BP's spill response program is intended to meet the response planning requirements of the relevant coastal states and applicable federal oil spill planning regulations. It also includes information regarding BP's Incident Management Team (IMT) and dedicated response assets, potential spill risks, and local environmentally sensitive areas. The OSRP describes personnel and equipment mobilization, the incident management team organization, and an overview of strategies, actions and notifications to be taken in the event of a spill.

BP will make every effort to respond to the Worst Case Discharge as effectively as practicable. A description of the response equipment to contain and recover the Worst Case Discharge is shown in **Figure 4**, which outlines contracted

equipment, personnel, materials and support vessels as well as temporary storage equipment to respond to the Worst Case Discharge. The list estimates individual times needed for procurement, load out, travel time to the site, and deployment. **Figure 4** also indicates how operations would be supported.

Using the estimated chemical and physical characteristics of crude oil, an ADIOS weathering model was run on a similar product from the ADIOS oil database. The results indicate 33% or approximately 59,400 barrels of crude oil would be evaporated/dispersed within 24 hours, with approximately 120,600 barrels remaining.

Natural Weathering Data: GC 584, Well C	Barrels of Oil
WCD Volume	180,000
<i>Less 33% natural evaporation/dispersion</i>	59,400
Remaining volume	120,600

4) Land Segment and Resource Identification

In compliance with NTL 2012-N06, BP has determined the land areas that could be potentially impacted by a potential oil spill using the BOEM Oil Spill Risk Analysis Model (OSRAM) for the Central and Western Gulf of Mexico available on the BOEM website. The results are shown in **Figure 1** below. The BOEM OSRAM identifies the highest probability of impact to the shorelines of Cameron Parish, Louisiana. **Figure 2** contains a list of environmental sensitivities, areas of socio-economic concern, and protection priorities. **Figure 3** contains a list of shoreline types found.

Cameron Parish includes the east side of Sabine Lake, Sabine National Wildlife Refuge, Calcasieu Lake, Lacassine National Wildlife Refuge (inland) and Grand Lake. Cameron Parish also includes the area along the coastline from Sabine Pass to Big Constance Lake in Rockefeller Wildlife Refuge. This region is composed of open public beaches, marshlands and swamps. It serves as a habitat for numerous birds, finfish and other animals, including several rare, threatened and endangered species.

**FIGURE 1**

**Trajectory by Land Segment**

Conditional probabilities of a spill in Green Canyon Block 584 (GC 584) contacting shoreline segments have been projected utilizing BP’s WCD and information in the BOEM Oil Spill Risk Analysis Model (OSRAM) (Ji et al., 2004) for the Central and Western Gulf of Mexico available on the BOEM website using 3, 10, and 30 day impact. The results are tabulated below.

Location	Shoreline Segment	County/Parish, State	Conditional Probability <sup>1</sup> (%)		
			3 Day	10 Day	30 day
<b>GC 584, Well ‘C’</b>  117 statute miles  OCS-G: G36297  Launch Area: C 45	C07	Calhoun, TX	--	--	1
	C08	Matagorda, TX	--	--	1
	C09	Brazoria, TX	--	--	1
	C10	Galveston, TX	--	--	2
	C12	Jefferson, TX	--	--	1
	C13	<b>Cameron, LA</b>	--	--	<b>4</b>
	C14	Vermilion, LA	--	--	2
	C15	Iberia, LA	--	--	1
	C17	Terrebonne, LA	--	--	2
	C18	Lafourche, LA	--	--	1
C20	Plaquemines, LA	--	--	2	

<sup>1</sup> Conditional probability refers to the probability of contact within the stated time period, assuming that a spill has occurred (-- indicates <0.5%).

FIGURE 2

Environmental Sensitivities – Cameron Parish, Louisiana

Sensitive Areas	Descriptions	Access	Wildlife	Contact
1) CAMERON AREA	On the Calcasieu River and Ship Channel 2.5 miles north of the GOM shoreline. Only route for marine life to enter and/or leave Calcasieu Lake and River Basin.	Take TX Hwy 82 south and then east from Port Arthur to Cameron. Also accessible by boat from the Calcasieu Ship Channel from the GOM. Oil company landings, USCOE facility and helicopter landing/fueling facilities.	<b>RTE:</b> <b>Brown pelican</b>  <b>Others:</b> Waterfowl (winter), long-billed curlew, peregrine falcon, marbled godwit, spotted sea trout (breeding), shrimp and blue crab (fall-spring), drum, southern flounder, gulf menhaden (spring-summer)	N/A
2) LOUISIANA GULF COAST AND JOHNSON'S BAYOU	GOM coastline from Louisiana Point (east of Sabine Pass) extending easterly to the west bank of Johnson's Bayou. Primarily composed of marshland and swamps.	Shoreline accessible by shallow draft vessels. Vehicle access is limited to 4-wheel drive vehicles via LA Hwy 82.	<b>RTE:</b> <b>Bald eagle (winter), piping plover (spring-summer)</b>  <b>Others:</b> Songbirds (spring), shorebirds, gulls, ruddy duck and other waterfowl (winter), finfish	N/A
3) LOUISIANA GULF COAST MUD LAKE TO WHITE LAKE INLAND TO GIWW	Shoreline on the GOM from Mud Lake to White Lake inland to the GIWW.	LA Hwy 82 parallels the coast about 5 miles from the beach. The beach is marshy salt grass and accessible only by marsh buggy, helicopter or airboat.	<b>RTE:</b> <b>None known</b>  <b>Others:</b> Waterfowl (winter), snowy egret, olivaceous cormorant, peregrine falcon, roseate spoonbill, white and brown shrimp, blue crab, finfish	N/A
4) ROCKEFELLER STATE WILDLIFE REFUGE	76,000 acres of brackish to saltwater marshes, shallow lakes and bayous in southwest LA. This area borders the Gulf of Mexico for 26.5 miles and extends inland toward the Grand Chenier ridge, a stranded beach ridge, six miles from the Gulf. Surveys indicate a wintering waterfowl population reaching 160,000.	There are few roads on the refuge. Major access is by small boat, marsh buggy or amphibious vehicle. The best location for a remote command post is at headquarters located on LA Hwy 82 approximately 10 miles east of Grand Chenier, LA. Equipment available: 1 amphibious dragline with 0.5 yard bucket, 1 marsh buggy, small boats, air boats and farm tractors.	<b>RTE:</b> <b>American alligator</b>  <b>Others:</b> Egrets and herons (breeding), dabbling ducks (winter), Canada goose and white-fronted goose (winter), peregrine falcon, roseate spoonbill, eastern oyster, menhaden, redfish, flounder, speckled trout, white and brown shrimp and blue crabs (nursery), furbearers (breeding)	Rockefeller SWR 5476 Grand Chenier Hwy Grand Chenier, LA 70643 Phone: (337) 491-2593
5) SABINE WILDLIFE REFUGE	125,000 acres of freshwater and brackish marshes interspersed with low prairie ridges. Calcasieu Lake transects the refuge on the east, and Sabine Lake adjoins it on the west.	By small boat, airboat, amphibious vehicle or marsh buggy. Launching facilities are at Johnson's Bayou landing for the southwest part of the refuge, at refuge headquarters for the west	<b>RTE:</b> <b>Bald eagle, brown pelican, Kemp's ridley sea turtle</b>  <b>Others:</b> Canada goose, white-fronted goose and other	Sabine NWR <i>Physical Location:</i> 3000 Holly Beach Hwy Hackberry, LA 70645 Phone: (337) 762-3816  <i>Office Address:</i> 1428 Highway 27

Sensitive Areas	Descriptions	Access	Wildlife	Contact
		side of Calcasieu Lake, and on the east side of the Cameron Ferry crossing for the east side of Calcasieu Lake. Remote command post could be set up at the refuge headquarters. Equipment available: 1 airboat, 4 outboard boats.	waterfowl (winter), peregrine falcon (winter), shrimp, sunfish, bass, spotted sea trout, southern flounder, blue catfish, red drum, alligator gar, small mammals, snakes	Bell City, LA 70630 Phone: (337) 598-2216

Areas of Socio-Economic Concern in Cameron Parish:

- Commercial fishing in Sabine Lake area
- Gas field in SNWR just north of Mud Lake
- Gulf States Utilities (GSU) water intake canal at the end of Old River Cove on the north end of Sabine Lake
- Heavy vessel traffic in Lake Charles
- Pleasure Island Marina
- Public beaches and recreational areas (Martin Beach, Gulfview Beach, Holly Peveto Beach, Rutherford Beach)
- Sabine Pass Battleground historical site

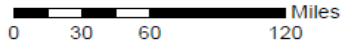
Protection Priorities for Cameron Parish:

- GSU intake canal
- Rockefeller Wildlife Refuge
- Sabine National Wildlife Refuge
- Other coastal marshlands

**FIGURE 3**

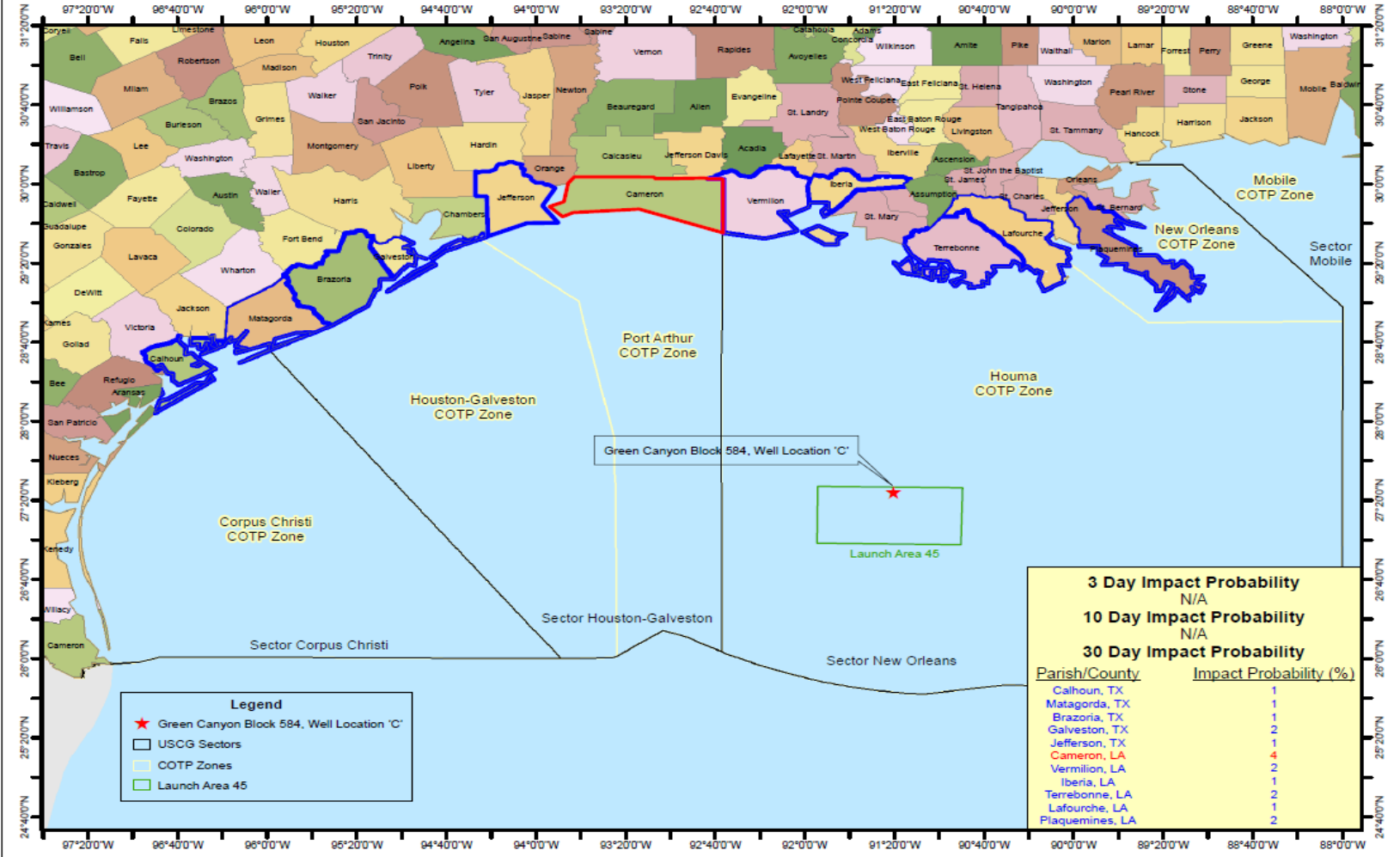
**Cameron Parish– Shorelines**

<b>Shoreline Type</b>	<b>Description</b>
<b>Fine Sand Beaches</b>	Beaches with low slopes and a grain-size of 0.625 to 0.200 mm. Low percentage of shells and hash. Major fine sand beaches on the delta plain are found at Southwest Pass, Pelican Island and Chandeleur Island.
<b>Perched Shell Beaches</b>	Shoreline type where a thin shell beach overlies a fresh or salt marsh with an eroded marsh platform outcropping in the surf zone. Organic debris is common to this shoreline type. Where the marsh platform outcrops on the shoreline, it can become re-vegetated by marsh grass.
<b>Shell Beaches</b>	Shoreline types comprised of almost entirely of shell. Shell material may be in the form of shell hash or whole shells. Shell beaches form extremely steep beach faces. Major shell beaches on the delta plain are found at Point Au Fer and Shell Island.
<b>Muddy Tidal Flats</b>	Shoreline types comprised of broad intertidal areas consisting of mud and minor amounts of shell hash. The grain-size is smaller than 0.0625 mm. Muddy tidal flats are typically found in association with prograding river mouths. Major muddy tidal flats on the delta plain are found at the Mississippi and Atchafalaya River mouths.
<b>Sandy Tidal Flats</b>	Shoreline types comprised of broad intertidal areas consisting of fine and coarse grain sand and minor amounts of shell hash. Mean grain size is between 0.0625 and 0.4 mm. Typically found in association with barrier island and tidal inlet systems. This type of flat is submerged during each tidal cycle and at low tide may be 100-200 m wide. Slight changes in water levels can produce significant shoreline changes. Low water levels can expose extensive tidal flat areas to oiling. Major sandy tidal flats on the delta plain are found at Barataria Bay and the Mississippi River mouth.



**BP Exploration & Production Inc.**  
**Green Canyon Block 584, Well Location 'C'**  
**Impact Probability Map**

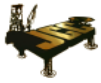
**Green Canyon Block 584, Well Location 'C'**  
**27° 24' 00.617"**  
**-91° 20' 29.424"**



**Legend**

- ★ Green Canyon Block 584, Well Location 'C'
- USCG Sectors
- COTP Zones
- Launch Area 45

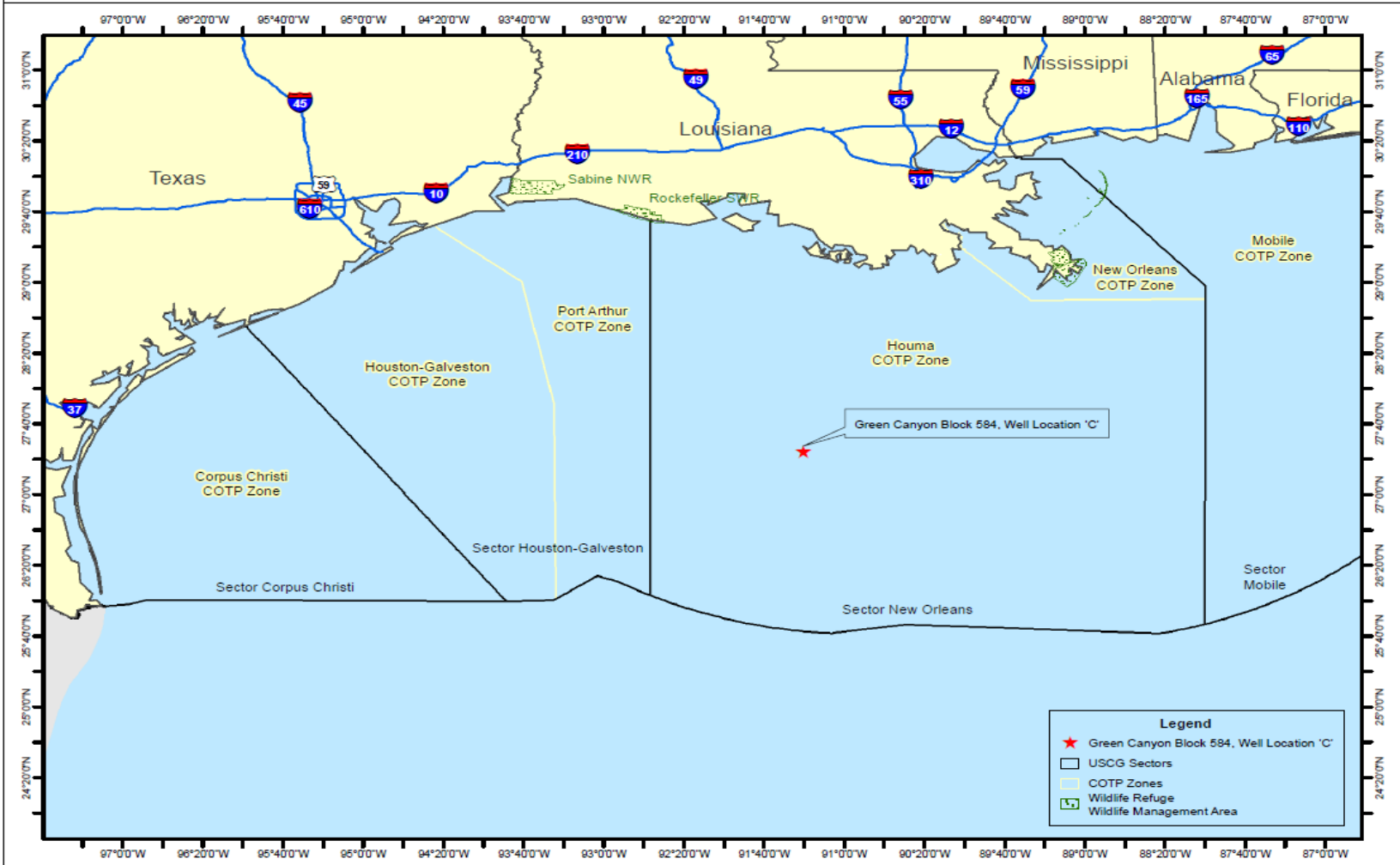
3 Day Impact Probability	
N/A	
10 Day Impact Probability	
N/A	
30 Day Impact Probability	
Parish/County	Impact Probability (%)
Calhoun, TX	1
Matagorda, TX	1
Brazoria, TX	1
Galveston, TX	2
Jefferson, TX	1
Cameron, LA	4
Vermilion, LA	2
Iberia, LA	1
Terrebonne, LA	2
Lafourche, LA	1
Plaquemines, LA	2

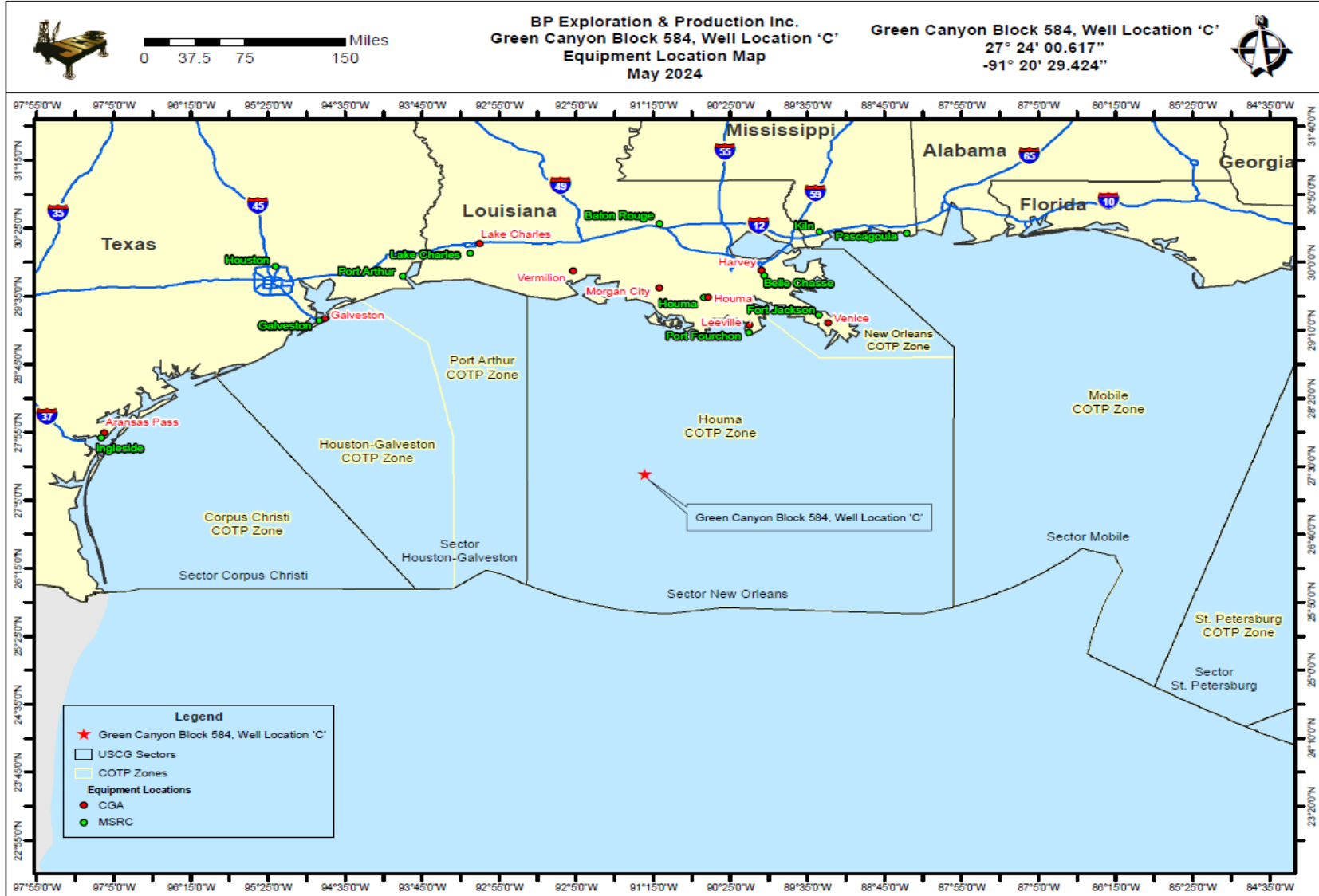


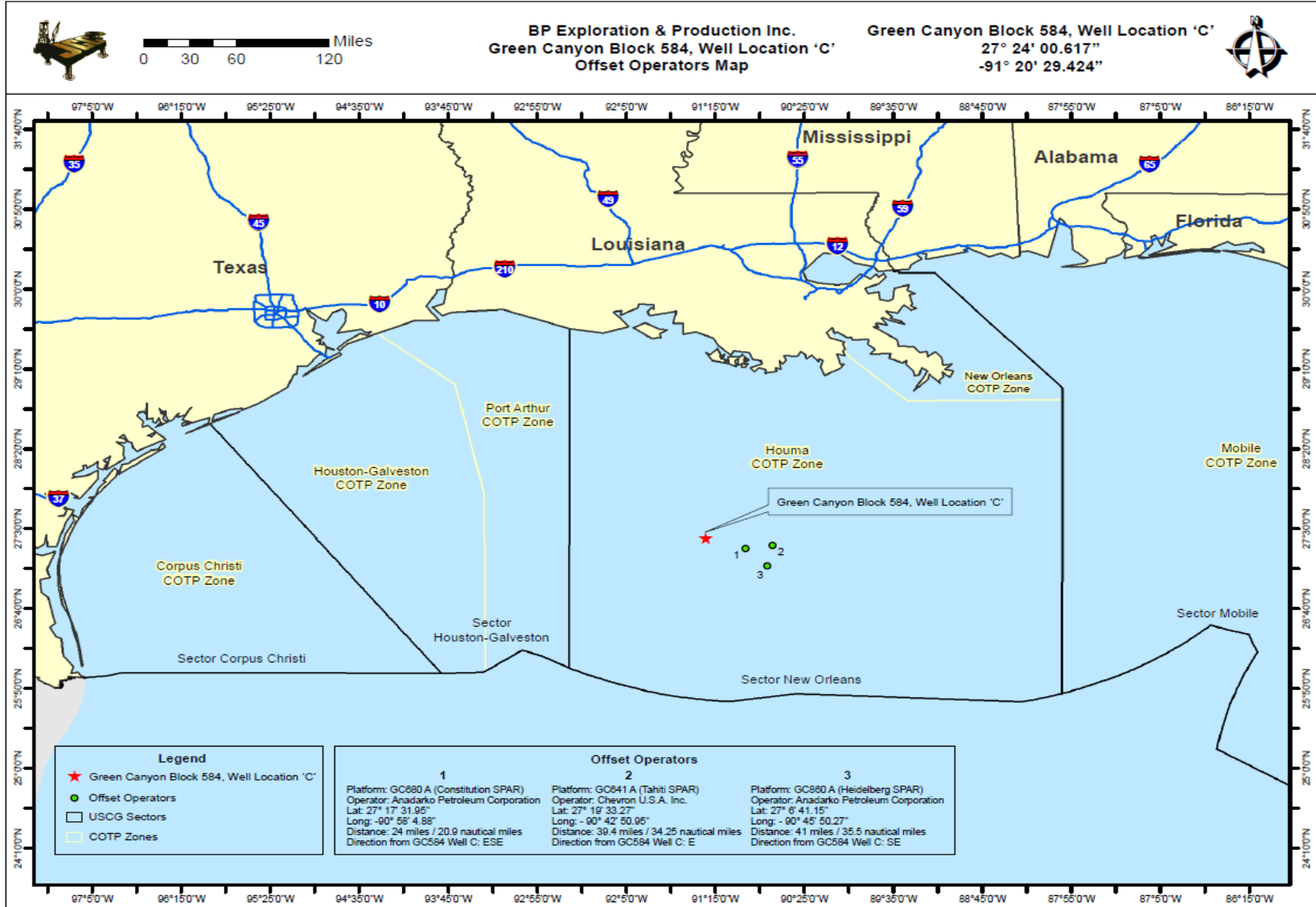
0 30 60 120 Miles

**BP Exploration & Production Inc.**  
**Green Canyon Block 584, Well Location 'C'**  
**Wildlife Refuge/Wildlife Management Areas Map**  
**May 2024**

**Green Canyon Block 584, Well Location 'C'**  
**27° 24' 00.617"**  
**-91° 20' 29.424"**







## 5) General Considerations for all Oil Spill Recovery Operations

BP will use all appropriate measures possible to safely and efficiently recover oil spilled from its well. These include but are not limited to:

- Conducting detailed safety analyses on response operations and preparing/disseminating resulting safety plans to all response personnel.
- Use of tactics described in the most current *MSRC Gulf Area Tactics Guide Book* and *CGA Equipment Guide Book and Tactic Manual* and any other appropriate tactics developed during the event.
- Configuring surface recovery systems to achieve maximum throughput and recovery efficiency rates:
  - Maximization of the use of advanced and adverse weather recovery systems to increase oil to recovery system encounter rates.
  - Use of vessels with the largest possible onboard recovered oil storage to minimize off-load times.
  - Use of appropriate vessels to deploy ocean boom to form the widest practical width to maximize oil to recovery system encounter rate.
  - Use of appropriate recovery systems to maximize recovery rate in all operable environmental conditions.
- Deployment of CGA and MSRC spill response equipment to recover and store oil while minimizing rig/derig and transit time, maximizing onboard storage and on-station time.
- Obtaining approval for decanting of oil to maximize storage capacity.
- Use of the most efficient, high volume pumps for oil recovery and decanting, offloading and lightering.
- Use of advanced technology (such as thermal infrared and multi-spectral cameras) to detect oil on the water's surface and classify it as recoverable or non-recoverable. This will allow more efficient use of on-water recovery task forces, maximize recovery rates and expand operational windows. This advanced technology is effective in both day and night time surveillance activities depending upon atmospheric conditions.
- Early consideration of advanced oil removal methods (e.g. dispersant application and in-situ burning) and coordination/consultation with the USCG and appropriate Regional Response Team for obtaining permission to proceed as necessary.
- Providing effective communication systems to allow for the command and control of deployed resources to ensure safety, reduce response times, and collect information necessary to develop a comprehensive, timely, and accurate Common Operational Picture (COP).

#### 6) Location Specific Worst Case Discharge Response

BP's Oil Spill Response Plan includes alternative response technologies such as dispersants and in-situ burn. Strategies will be decided by Unified Command based on an operations safety analysis, the size of the spill, weather and potential impacts. If the conditions are favorable for dispersant application and/or in-situ burning, once the proper approvals have been obtained and the proper planning is in place, dispersant application and/or in-situ burning of oil may be employed. Slick containment boom will be immediately called out and on scene as soon as possible. Offshore response strategies may include attempting to skim utilizing CGA and MSRC spill response equipment, with a total derated skimming capacity of 823,711 barrels. Temporary storage associated with skimming equipment equals 273,796 barrels. If additional storage is needed, various storage barges with a total capacity of 1,134,000+ barrels may be mobilized and centrally located to provide temporary storage and minimize off-loading time. **Safety is first priority. Air monitoring will be conducted, and operations deemed safe prior to the commencement of any containment/skimming operations.**

If the spill went unabated, shoreline impact in Cameron and/or Plaquemines Parish, Louisiana would depend upon existing environmental conditions. Shoreline protection will include the use of CGA and MSRC near shore and shallow water skimmers with a total derated skimming capacity of 272,589 barrels. Temporary storage associated with skimming equipment equals 8,487 barrels. If additional storage is needed, various storage barges with a total capacity of 677,000+ barrels may be mobilized and centrally located to provide temporary storage and minimize off-loading time. Onshore response may include the deployment of shoreline boom on beach areas, or protection and sorbent boom on vegetated areas. Contracts with AMPOL and MSRC will ensure access to 98,750 feet of 18" shoreline protection boom. **Figure 4** outlines individual times needed for procurement, load out, travel time to the site and deployment. Strategies will be based upon surveillance and real time trajectories that depict areas of potential impact given actual sea and weather conditions. Applicable Area Contingency Plans (ACPs), Geographic Response Plans (GRPs), federal and state agencies that oversee and manage some of the resources that may be at risk, and Unified Command (UC) will be consulted to ensure that environmental and special economic resources are correctly identified and prioritized to ensure optimal protection. BP's IMT has access to the applicable ACP(s) and GRP(s) Shoreline protection strategies that depict the protection response modes applicable for oil spill clean-up operations. As a secondary resource, the State of Louisiana Initial Oil Spill Response Plan will be consulted as appropriate to provide detailed shoreline protection strategies and describe necessary action to keep the oil spill from entering Louisiana's coastal wetlands. The UC should take into consideration all appropriate items detailed in the Tactics discussion below. The UC and their personnel have the option to modify the deployment and operation of equipment to allow for a more effective response to site-specific circumstances.

Based on the anticipated worst case discharge scenario, BP can estimate onsite arrival of contracted oil spill recovery equipment with adequate response capacity to contain and recover surface hydrocarbons, and prevent land impact, to the maximum extent practicable, within approximately 64 hours (based on the equipment's Effective Daily Recovery Capacity (EDRC) and expected travel time to spill site).

## 7) Response Strategies

BP will take action to provide a safe, coordinated response to contain and recover spilled oil in a timely manner. Response actions will be designed to provide protection strategies meant to recover oil and protect the responders, the public, wildlife and environmentally sensitive areas. Safety will take precedence over all other considerations during these operations.

Coordination of response assets will be supervised by the designation of a SIMOPS group as necessary for close quarter vessel response activities. Most often, this group will be used during source control events that require a significant number of large vessels operating independently to complete a common objective, in close coordination and support of each other. This group must also monitor the subsurface activities of each vessel (ROV, dispersant application, well control support, etc.).

In addition, these activities will be monitored by the IMT and UC via a structured COP established to track resource and slick movement in real time.

### **Offshore Response**

#### *Surveillance*

- Aerial Observation:
  - Deployment of surveillance aircraft as soon as possible
  - Trained observer to provide on-site status reports
  - Aerial photography and visual confirmation
- Command and control platform at the site if needed
- Remote Sensing:
  - Use of thermal infrared and multi-spectral sensing systems or other technology to detect oil and classify it as recoverable or non-recoverable to enhance on-water recovery capability
  - Surveillance platforms should be appropriate for weather and atmospheric conditions to provide the greatest altitude (e.g. aircraft, aerostats or ship mounted)
  - Continued surveillance of oil movement by remote sensing systems
- Continuous monitoring of vessel assets using vessel monitoring systems

#### *Dispersant application*

- Place aerial dispersant providers on standby.
- Depending on the scenario, a Modular Subsea Dispersant Application Unit (MSDAU) may be ordered and installed at or adjacent to the spill site.
- Conduct analysis to determine appropriateness of dispersant application (refer to Section 18 of approved Oil Spill Response Plan).
- Obtain regulatory approval for use of surface and subsea dispersants.
- Caution will be taken to ensure safety of wildlife and avoid spraying over marine mammals, marine turtles, and flocks of birds.
- Conduct initial dispersant test to ensure effectiveness of dispersants.
- Confirm dispersant availability for current and long range operations.
- Coordinate deployment of a Special Monitoring of Applied Response Technologies (SMART) team as required.
- Coordinate movement of dispersants, aircraft, and support equipment and personnel.
- Initiate orders for additional dispersant stocks required for expected operations.

#### *Dispersant monitoring*

- BP will follow and comply with regulatory requirements in 40 CFR 300.913.

#### *Containment boom*

- Call out OSRO boom equipment early and expedite deployment.
- Ensure boom handling and mooring equipment is deployed with boom.
- Provide continuous reports to vessels to expedite their arrival at sites and provide for most effective containment.
- Use support vessels to deploy and maintain boom.

#### *Dedicated offshore skimming systems*

- Determine if weather conditions allow for skimming operations.
- Deployed to the highest concentration of oil.
- Assets deployed at safe distance from aerial dispersant and in-situ burn operations.
- Deploy OSRO's mechanical recovery equipment such as OSRVs, OSRBs, and VOSS.
- Vessels should be organized into task forces or groups with consideration for effective communication and control.
- The use of alternative spill surveillance technologies could be used to guide skimming vessels during night time operations.
- FOSC/SOSC approval will be requested prior to decanting operations.

#### *Storage Vessels*

- Establish availability of contracted assets (Appendix E of BP GoM OSRP).
- Early call out (to allow for tug boat acquisition and deployment speeds).
- Phase mobilization to allow storage vessels to arrive with skimming systems.
- Position as closely as possible to skimming assets to minimize offloading time.

#### *In-situ Burn Assets*

- Determine appropriateness of in-situ burning in coordination with the FOSC and affected SOSC.
- Conduct analysis to determine appropriateness of in-situ burn application (refer to Section 19 of approved Oil Spill Response Plan).
- Obtain regulatory approval to conduct in-situ burn operations.
- Determine availability of fire boom and select ignition systems.
- Determine assets to perform on-water operations.
- Build operations into safety plan.
- Initiate orders for additional fire boom stocks required for expected operations.
- Conduct initial test burn to ensure effectiveness.
- Conduct operations in accordance with an approved plan.

#### *Adverse Weather Operations:*

During adverse weather conditions, such as seas being greater than three (3) feet, the use of larger recovery and storage vessels, oleophilic skimmers, and large offshore boom will be maximized. Safety will be the overriding factor and operations will cease on the order of the UC or vessel captain. In an emergency, "stop work" may be directed by any crew member.

## **Near Shore Response Actions**

### *Timing*

- Put near shore assets on standby and deploy in accordance with planning based on the actual situation, real time trajectories and oil budgets.
- Support vessel identification and induction training in advance of spill nearing shoreline if possible.
- Outfitting of support vessels for specific missions.
- Deployment of assets based on actual movement of oil.

### *Considerations*

- Water depth, vessel draft
- Shoreline gradient
- State of the oil
- Use of support vessels
- Distance of surf zone from shoreline

### *Surveillance*

- Trained observer to direct skimming operations
- Continuous surveillance of oil movement by remote sensing systems, aerial photography and visual confirmation
- Continuous monitoring of vessel assets

### *Dispersant Use*

- Generally will not be approved within 3 miles of shore or with less than 10 meters of water depth
- Approval would be at Regional Response Team level (Region 6) on a case by case basis

## Shoreline Protection Operations

### *Response Planning Considerations*

- Review appropriate Area Contingency Plan(s).
- Locate and review appropriate Geographic Response and Site Specific Plans.
- Refer to associated Environmentally Sensitive Area Maps.
- Ensure capability of continuous analysis of trajectories run periodically during response.
- Order personnel and equipment.
- Perform aerial surveillance of oil movement.
- Perform Pre-impact beach cleaning and debris removal.
- Adhere to Shoreline Cleanup Assessment Team (SCAT) Plans.
- Determine requirements and availability of boom types, sizes and lengths.
- Consider need for in-situ burning in near shore areas.
- Assess current wildlife situation, especially status of migratory birds, threatened and endangered species
- Check for critical habitat in the area.
- Check for archeological sites and arrange assistance for the appropriate state agency when planning operations may impact these areas.

### *Placement of boom*

- Position boom in accordance with the information gained from references listed above and based on the actual situation.
- Determine areas of natural collection and develop booming strategies accordingly.
- Assess timing of boom placement based on the most current trajectory analysis and the availability of each type of boom needed. Determine an overall booming priority and conduct booming operations accordingly.  
Consider:
  - Trajectories.
  - Weather forecast.
  - Oil impact forecast.
  - Verified spill movement.
  - Boom, manpower and vessel (shallow draft) availability.
  - Near shore boom and support material, (stakes, anchors, line).

### *Beach Preparation Considerations and Actions*

- Review SCAT reports and recommendations.
- Monitor tide tables and weather to determine extent of high tides.
- Pre-clean beaches by moving waste/organic matter above high tide lines to minimize waste.
- Determine if it is considered a sensitive area or a critical habitat (i.e turtle nesting grounds).
- Determine logistical requirements of waste removal and disposal.
- Stage equipment and housing of response personnel as close to job site as possible to maximize on-site work time.
- Tend to boom, repair, replace and secure as needed (use of local assets may be advantageous).
- Maintain constant awareness of weather and oil movement for resource re-deployment as necessary.
- Consider earthen berms and shoreline protection boom to protect sensitive inland areas.
- Requisition earth moving equipment.
- Plan for efficient and safe use of personnel, ensuring:
  1. Assessment of remediation requirements, i.e., replacement of sands, rip rap, etc.
  2. Availability of surface washing agents and associated protocol requirements for their use (see National Contingency Plan (NCP) Product Schedule for list of possible agents).
  3. Discussion with all stakeholders, i.e., land owners, refuge/park managers, and others as appropriate, covering the following:
    - Access to areas.

- Possible response measures and impact of property and ongoing operations.
- Determination of any specific safety concerns.
- Any special requirements or prohibitions.
- Area security requirements.
- Handling of waste.
- Remediation expectations.
- Vehicle traffic control.
- Domestic animal safety concerns.
- Wildlife or exotic game concerns/issues.

*Inland and Coastal Marsh Protection and Response Considerations and Actions*

- All considered response methods will be weighed against the possible damage they may do to the marsh. Methods will be approved by Unified Command only after discussions with local Stakeholder, as identified above.
  - In-situ burn may be considered when marshes have been impacted.
- Passive clean-up of marshes should be considered and appropriate stocks of sorbent boom and/or sweep obtained.
- Response personnel must be briefed on methods to traverse the marsh, i.e.,
  - Use of appropriate vessels.
  - Use of temporary walkways or roadways.
- Discuss and gain approval prior to cutting or moving vessels through vegetation.
- Discuss use of vessels that may disturb wildlife, i.e, airboats.
- Ensure safe movement of vessels through narrow cuts and blind curves.
- Consider the possibility that no response in a marsh may be best.
- In the deployment of any response asset, actions will be taken to ensure the safest, most efficient operations possible. This includes, but is not limited to:
  - Planning for stockage of high use items for expeditious replacement.
  - Use of shallow water craft.
  - Use of communication systems appropriate ensure command and control of assets.
  - Use of appropriate boom in areas that can offer effective protection.
  - Planning of waste collection and removal to maximize cleanup efficiency.
- Consideration of on-site remediation of contaminated soils to minimize replacement operations and impact on the area.

8) Equipment Limitations

The capability for any spill response equipment, whether a dedicated or portable system, to operate in differing weather conditions will be directly in relation to the capabilities of the vessel the system is placed on. Most importantly, however, the decision to operate will be based on the judgment of the Unified Command and/or the Captain of the vessel, who will ultimately have the final say in terminating operations. Skimming equipment listed below may have operational limits which exceed those safety thresholds.

Boom	3 foot seas, 20 knot winds
Dispersants	Winds more than 25 knots Visibility less than 3 nautical miles Ceiling less than 1,000 feet.
FRU	8 foot seas
HOSS Barge/OSRB	8 foot seas
Koseq Arms	8 foot seas
OSRV	4 foot seas

9) Environmental Conditions in the GOM

Louisiana is situated between the easterly and westerly wind belts, and therefore experiences westerly winds during the winter and easterly winds in the summer. Average wind speed is generally 14-15 mph along the coast. Wave heights average 4 and 5 feet. However, during hurricane season, Louisiana has recorded wave heights ranging from 40 to 50 feet high and winds reaching speeds of 100 mph. Because much of southern Louisiana lies below sea level, flooding is prominent.

Surface water temperature ranges between 70 and 80 ° F during the summer months. During the winter, the average temperature will range from 50 and 60 ° F.

The Atlantic and Gulf of Mexico hurricane season is officially from 1 June to 30 November. About 97% of all tropical activity occurs within this window. The Atlantic basin shows a very peaked season from August through October, with 78% of the tropical storm days, 87% of the minor (Saffir-Simpson Scale categories 1 and 2) hurricane days, and 96% of the major (Saffir-Simpson categories 3, 4 and 5) hurricane days occurring then. Maximum activity is in early to mid-September. Once every few years there may be a hurricane occurring "out of season" - primarily in May or December. Globally, September is the most active month and May is the least active month.

**WCD Scenario– BASED ON WELL BLOWOUT DURING DRILLING OPERATIONS (117 statute miles from shore)**  
 120,600 bbls of crude oil (Volume considering natural weathering, based on 24-hour estimate)  
 API Gravity 25.6°

**FIGURE 4 – Equipment Response Time to GC 584 Well ‘C’**

**Surveillance Aircraft**

Dispersant/Surveillance	Dispersant Capacity (gal)	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to site	Total Hrs
ASI (available through contract with CGA)							
Twin Commander	NA	2	Houma	2	2	0.5	4.5

**Dispersant Aircraft**

Name/Type	Dispersant Capacity (gal)	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to site	Total Hrs
ASI (available through contract with CGA)							
Basler 67T	2000	2	Houma, LA	2	2	0.5	4.5
DC 3	1200	2	Houma, LA	2	2	0.8	4.8
DC 3	1200	2	Houma, LA	2	2	0.8	4.8
MSRC							
737 – N735Z	4,125	3	Shenandoah Valley, VA	2	2	2.0	6.0
737 – N735T	4,125	4	Moses Lake, WA	2	2	4.4	8.4

**Offshore Response**

Offshore Equipment Pre-Determined Staging	EDRC	Storage Capacity	Support Vessel(s)	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
CGA											
95' FRV	22885	249	NA	6	Venice, LA	2	0	2	6	1	11
95' FRV	22885	249	NA	6	Leeville, LA	2	0	2	5	1	10
95' FRV	22885	249	NA	6	Galveston, TX	2	0	2	9	1	14
95' FRV	22885	249	NA	6	Vermilion, LA	2	0	2	7	1	12
Boom Barge (CGA-300) 42" Auto Boom (25000')	NA	NA	1 Tug 50 Crew	4 (Barge) 2 (Per Crew)	Leeville, LA	8	0	4	12	2	26
HOSS Barge	76285	4000	3 Tugs	8	Harvey, LA	6	0	10	25	2	43

Offshore Equipment Pre-determined Staging	EDRC	Storage Capacity	VOO	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
MSRC											
Louisiana Responder 1 Transrec 350 2,640' 67" Curtain Pressure Boom	10567	4000	NA	11	Fort Jackson, LA	2	1	4	11	1	19
MSRC 401 Offshore Barge 1 Crucial Disk 88/30 2,640' 67" Curtain Pressure Boom	11122	40000	3 Tugs	9	Fort Jackson, LA	4	1	6	21	1	33
S.T. Benz Responder 1 LFF 100 Brush 2,640' 67" Curtain Pressure Boom	18086	4000	NA	11	Grand Isle, LA	3	1	1	11	1	17
Mississippi Responder 1 Transrec 350 2,640' 67" Curtain Pressure Boom	10567	4000	NA	11	Pascagoula, MS	2	1	2	22	1	28
MSRC 402 Offshore Barge 1 Crucial Disk 88/30 2,640' 67" Curtain Pressure Boom	11122	40300	3 Tugs	9	Pascagoula, MS	4	1	3	31	1	40
Gulf Coast Responder 1 Transrec 350 2,640' 67" Curtain Pressure Boom	10567	4000	NA	11	Lake Charles, LA	2	1	4	17	1	25
Texas Responder 1 Transrec 350 2,640' 67" Curtain Pressure Boom	10567	4000	NA	11	Galveston, TX	2	1	1	21	1	26
MSRC 570 Offshore Barge 1 Crucial Disk 88/30 2,640' 67" Curtain Pressure Boom	11122	56900	3 Tugs	9	Galveston, TX	4	1	2	30	1	38
Southern Responder 1 Transrec 350 2,640' 67" Curtain Pressure Boom	10567	4000	NA	11	Ingleside, TX	2	1	2	32	1	38

MSRC 403 Offshore Barge 1 Crucial Disk 88/30 2,640' 67" Curtain Pressure Boom	11122	40300	3 Tugs	9	Ingleside, TX	4	1	3	42	1	51
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Recovered Oil Storage Pre-Determined Staging	EDRC	Storage Capacity	VOO	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
Enterprise Marine Services LLC (Available through contract with CGA)											
CTCo 2603	NA	25000	1 Tug	6	Amelia	19	0	6	22	1	48
CTCo 2604	NA	20000	1 Tug	6	Amelia	19	0	6	22	1	48
CTCo 2605	NA	20000	1 Tug	6	Amelia	19	0	6	22	1	48
CTCo 2606	NA	20000	1 Tug	6	Amelia	19	0	6	22	1	48
CTCo 2607	NA	23000	1 Tug	6	Amelia	19	0	6	22	1	48
CTCo 2608	NA	23000	1 Tug	6	Amelia	19	0	6	22	1	48
CTCo 2609	NA	23000	1 Tug	6	Amelia	19	0	6	22	1	48

Offshore Recovered Oil Storage Pre-determined Staging	EDRC	Storage Capacity	Support Vessel(s)	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
Kirby Offshore (available through contract with CGA and/or MSRC)											
RO Barge	NA	80000+	1 Tug	6	Venice	35	0	4	20	1	60
RO Barge	NA	80000+	1 Tug	6	Venice	35	0	4	20	1	60
RO Barge	NA	80000+	1 Tug	6	Venice	35	0	4	20	1	60
RO Barge	NA	100000+	1 Tug	6	Venice	35	0	4	20	1	60
RO Barge	NA	100000+	1 Tug	6	Venice	35	0	4	20	1	60
RO Barge	NA	100000+	1 Tug	6	Venice	35	0	4	20	1	60
RO Barge	NA	130000+	1 Tug	6	Venice	35	0	4	20	1	60
RO Barge	NA	150000+	1 Tug	6	Venice	35	0	4	20	1	60
RO Barge	NA	160000+	1 Tug	6	Venice	35	0	4	20	1	60

**Staging Area: Fourchon**

Offshore Equipment With Staging	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Site	Hrs to Deploy	Total Hrs
T&T Marine (available through direct contract with CGA)											
Aqua Guard Triton RBS (1)	22323	2000	1 Utility	6	Harvey	4	12	3	11	2	32
Aqua Guard Triton RBS (1)	22323	2000	1 Utility	6	Galveston	4	12	12	11	2	41
Koseq Skimming Arms (2) Lamor brush	45770	12000	2 OSV	12	Harvey	24	24	3	11	2	64
Koseq Skimming Arms (4) MariFlex 150 HF	72652	24000	4 OSV	24	Harvey	24	24	3	11	2	64
CGA											
FRU (1) + 100 bbl Tank (4)	4251	200	2 Utility	6	Vermilion	2	5	5.5	11	1	24.5
FRU (3) + 100 bbl Tank (6)	12753	600	3 Utility	18	Leeville	2	5	2	11	1	21
FRU (2) + 100 bbl Tank (4)	8502	400	2 Utility	12	Venice	2	5	5	11	1	24
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Galveston	2	5	12	11	1	31
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Aransas Pass	2	5	16.5	11	1	35.5
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Lake Charles	2	5	7	11	1	26

**Staging Area: Fourchon**

Offshore Equipment Preferred Staging	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Site	Hrs to Deploy	Total Hrs
MSRC											
Crucial Disk 56/30 Skimmer (1)	5671	500	1 Utility	5	Ingleside	1	1	16.5	11	1	30.5
GT-185 Skimmer w Adaptor (1)	1371	500	1 Utility	5	Ingleside	1	1	16.5	11	1	30.5
Foilex 250 Skimmer (1)	3977	500	1 Utility	5	Ingleside	1	1	16.5	11	1	30.5
Stress I Skimmer (1)	15840	500	1 Utility	5	Ingleside	1	1	7	11	1	22
Walosep 4 Skimmer (1)	3017	500	1 Utility	5	Ingleside	1	1	16.5	11	1	30.5
Crucial Disk 88/30 Skimmer (1)	11122	500	1 PSV	9	Galveston	1	1	12	11	1	26
Crucial Disk 88/30 Skimmer (1)	11122	500	1 PSV	9	Galveston	1	1	12	11	1	26
GT-185 Skimmer w Adaptor (2)	2742	1000	2 Utility	10	Galveston	1	1	12	11	1	26
Walosep 4 Skimmer (1)	3017	500	1 Utility	5	Galveston	1	1	12	11	1	26
Foilex 250 Skimmer (1)	3977	500	1 Utility	5	Galveston	1	1	12	11	1	26
Stress I Skimmer (1)	15840	500	1 Utility	5	Galveston	1	1	12	11	1	26
GT-185 Skimmer w Adaptor (1)	1371	500	1 Utility	5	Port Arthur	1	1	8.5	11	1	22.5
Desmi Skimmer (1)	3017	500	1 Utility	5	Lake Charles	1	1	7	11	1	21

Foilex 250 Skimmer (1)	3977	500	1 Utility	5	Lake Charles	1	1	7	11	1	21
GT-185 Skimmer w Adaptor (1)	1371	500	1 Utility	5	Lake Charles	1	1	7	11	1	21
Stress I Skimmer (1)	15840	1000	2 Utility	10	Lake Charles	1	1	7	11	1	21
Stress I Skimmer (1)	15840	1000	2 Utility	10	Lake Charles	1	1	7	11	1	21
Lamor LUF Brush Skimmer (1) <i>1,320' 67" Curtain Pressure Boom</i>	18086	1000	1 PSV	9	Lake Charles	1	1	7	11	1	21
Lamor LUF Brush Skimmer (1) <i>1,320' 67" Curtain Pressure Boom</i>	18086	1000	1 PSV	9	Lake Charles	1	1	7	11	1	21
Transrec 350 Skimmer (1) <i>1,320' 67" Curtain Pressure Boom</i>	10567	1000	1 PSV	9	Lake Charles	1	1	7	11	1	21
Transrec 350 Skimmer (1) <i>1,320' 67" Curtain Pressure Boom</i>	10567	1000	1 PSV	9	Lake Charles	1	1	7	11	1	21

**Staging Area: Fourchon**

Offshore Equipment Preferred Staging	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Site	Hrs to Deploy	Total Hrs
MSRC											
Stress I Skimmer (1)	15840	500	1 Utility	5	Grand Isle	1	1	1	11	1	15
Lamor LUF Brush Skimmer (1) <i>1,320' 67" Curtain Pressure Boom</i>	18086	1000	1 PSV	9	Grand Isle	1	1	1	11	1	15
Lamor LUF Brush Skimmer (1) <i>1,320' 67" Curtain Pressure Boom</i>	18086	1000	1 PSV	9	Houma	1	1	2	11	1	16
Foilex 250 Skimmer (1)	3977	500	1 Utility	5	Belle Chasse	1	1	3	11	1	17
Foilex 200 Skimmer (1)	1989	500	1 Utility	5	Belle Chasse	1	1	3	11	1	17
Crucial Disk 56/30 Skimmer (1)	5671	500	1 Utility	5	Belle Chasse	1	1	3	11	1	17
GT-185 Skimmer w Adaptor (1)	1371	500	1 Utility	5	Fort Jackson	1	2	0.5	11	1	15.5
Walosep W4 Skimmer (1)	3017	500	1 Utility	5	Fort Jackson	1	2	0.5	11	1	15.5
Desmi Skimmer (1)	3017	500	1 Utility	5	Fort Jackson	1	1	5	11	1	19
Stress I Skimmer (1)	15840	500	1 Utility	5	Fort Jackson	1	1	5	11	1	19
Crucial Disk 88/30 Skimmer (1) <i>1,320' 67" Curtain Pressure Boom</i>	11122	1000	1 PSV	9	Fort Jackson	1	1	5	11	1	19
Crucial Disk 88/30 Skimmer (1) <i>1,320' 67" Curtain Pressure Boom</i>	11122	1000	1 PSV	9	Fort Jackson	1	1	5	11	1	19
Crucial Disk 88/30 Skimmer (1) <i>1,320' 67" Curtain Pressure Boom</i>	11122	1000	1 PSV	9	Fort Jackson	1	1	5	11	1	19
GT-185 Skimmer (1)	1371	500	1 Utility	5	Pascagoula	1	1	6	11	1	20
Crucial Disk 88/30 Skimmer (1)	11122	500	1 PSV	9	Pascagoula	1	1	6	11	1	20
Crucial Disk 88/30 Skimmer (1)	11122	500	1 PSV	9	Pascagoula	1	1	6	11	1	20
Stress I Skimmer (1)	15840	500	1 Utility	5	Pascagoula	1	1	6	11	1	20

Stress II Skimmer (1)	3017	500	1 Utility	5	Pascagoula	1	1	6	11	1	20
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**Staging Area: Fourchon**

Offshore Equipment Preferred Staging	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Site	Hrs to Deploy	Total Hrs
CGA											
Hydro-Fire Boom	NA	NA	8 Utility	40	Harvey	0	24	2	11	6	41
MSRC											
67" Curtain Pressure Boom (53570')	NA	NA	80*	160	Houston	1	2	11	11	1	26
1000' Fire Resistant Boom	NA	NA	3*	6	Galveston	1	4	12	11	6	34
16000' Fire Resistant Boom	NA	NA	3*	6	Houston	1	4	11	11	6	33
2000' Hydro Fire Boom	NA	NA	8*	8	Lake Charles	1	4	7	11	6	29

*\* Utility Boats, Crew Boats, Supply Boats, or Fishing Vessels*

**Nearshore Response for Cameron Parish**

**Staging Area: Fourchon**

Nearshore Equipment Pre-determined Staging	EDRC	Storage Capacity	VOO	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
CGA											
Mid-Ship SWS	22885	249	NA	4	Leeville	2	0	N/A	48	1	51
Mid-Ship SWS	22885	249	NA	4	Venice	2	0	N/A	48	1	51
Mid-Ship SWS	22885	249	NA	4	Galveston	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Morgan City	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Lake Charles	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Vermilion	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Galveston	2	0	N/A	48	1	51
46' FRV	15257	65	NA	4	Aransas Pass	2	0	2	21	1	26
46' FRV	15257	65	NA	4	Morgan City	2	0	2	2.5	1	7.5
46' FRV	15257	65	NA	4	Lake Charles	2	0	2	7	1	12
46' FRV	15257	65	NA	4	Venice	2	0	2	3.5	1	8.5
MSRC											
MSRC Quick Strike 2 LORI Brush Pack	5000	50	NA	3	Lake Charles	2	0	1	8	1	12
Enterprise Marine Services LLC (Available through contract with CGA)											
CTCo 5001	NA	47000	1 Tug	6	Amelia	34.5	0	6	6.5	1	48

**Staging Area: Fourchon**

Recovered Oil Storage Pre-Determined Staging	EDRC	Storage Capacity	VOO	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
Kirby Offshore (available through contract with CGA)											
RO Barge	NA	80000+	1 Tug	6	Venice	35	0	4	20	1	60
RO Barge	NA	100000+	1 Tug	6	Venice	35	0	4	20	1	60
RO Barge	NA	100000+	1 Tug	6	Venice	35	0	4	20	1	60
RO Barge	NA	100000+	1 Tug	6	Venice	35	0	4	20	1	60
RO Barge	NA	110000+	1 Tug	6	Venice	35	0	4	20	1	60
RO Barge	NA	140000+	1 Tug	6	Venice	35	0	4	20	1	60

**Staging Area: Fourchon**

Nearshore Equipment With Staging	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Load Out	Travel to Staging	Travel to Deployment	Hrs to Deploy	Total Hrs
CGA											
SWS Egmopol	1810	100	NA	3	Galveston	2	2	12	2	1	19
SWS Egmopol	1810	100	NA	3	Leeville	2	2	2	2	1	8

SWS Marco	3588	20	NA	3	Lake Charles	2	2	7	2	1	14
SWS Marco	3588	34	NA	3	Leeville	2	2	2	2	1	8
SWS Marco	3588	34	NA	3	Venice	2	2	5	2	1	12
Foilex Skim Package (TDS 150)	1131	50	NA	3	Lake Charles	4	12	7	2	2	27
Foilex Skim Package (TDS 150)	1131	50	NA	3	Galveston	4	12	11.5	2	2	31.5
Foilex Skim Package (TDS 150)	1131	50	NA	3	Harvey	4	12	3	2	2	23
4 Drum Skimmer (Magnum 100)	680	100	1 Crew	3	Lake Charles	2	2	7	2	1	14
4 Drum Skimmer (Magnum 100)	680	100	1 Crew	3	Harvey	2	2	3	2	1	10
2 Drum Skimmer (TDS 118)	240	100	1 Crew	3	Lake Charles	2	2	7	2	1	14
2 Drum Skimmer (TDS 118)	240	100	1 Crew	3	Harvey	2	2	3	2	1	10
MSRC											
30 ft. Kvichak <i>Marco I Skimmer</i>	3588	24	NA	2	Ingleside	1	1	2	17	1	22
30 ft. Kvichak <i>Marco I Skimmer</i>	3588	24	NA	2	Galveston	1	1	12	2	1	17
30 ft. Kvichak <i>Marco I Skimmer</i>	3588	24	NA	2	Belle Chasse	1	1	3	2	1	8
30 ft. Kvichak <i>Marco I Skimmer</i>	3588	24	NA	2	Pascagoula	1	1	6	2	1	11
AardVac Skimmer (1)	3840	500	1 Utility	5	Lake Charles	1	1	7	2	1	12
AardVac Skimmer (1)	3840	500	1 Utility	5	Pascagoula	1	1	6	2	1	11
Queensboro Skimmer (1)	905	500	1 Pushboat	4	Galveston	1	1	12	2	1	17
Queensboro Skimmer (5)	4525	2500	5 Pushboat	20	Lake Charles	1	1	7	2	1	12
Queensboro Skimmer (1)	905	500	1 Pushboat	4	Belle Chasse	1	1	3	2	1	8
Queensboro Skimmer (1)	905	500	1 Pushboat	4	Pascagoula	1	1	6	2	1	11
WP 1 Skimmer (1)	3017	500	1 Utility	5	Pascagoula	1	1	6	2	1	11

**Shoreline Protection Response for Cameron Parish**

Shoreline Protection Boom	VOO	Persons Req.	Storage/Warehouse Location	Hrs to Procure	Hrs to Loadout	Travel to Fourchon	Travel to Deployment	Hrs to Deploy	Total Hrs
MSRC									
50 feet	1 Crew	2	Port Arthur, TX	1	1	10	2	3	17
150 feet	1 Crew	2	Galveston, TX	1	1	13	2	3	20
50 feet	1 Crew	2	Ingleside, TX	1	1	18	2	3	25
9,700' 18" Boom	5 Crew	10	Lake Charles, LA	1	1	8	2	3	15
100' 18" Boom	1 Crew	2	Belle Chasse, LA	1	1	2	2	3	9
6,950' 18" Boom	4 Crew	8	Pascagoula, MS	1	1	5	2	3	12
50' 18" Boom	1 Crew	2	Tampa, FL	1	1	21	2	3	28
2,950' 18" Boom	3 Crew	6	Miami, FL	1	1	27	2	3	34
AMPOL (available through MSA)									
34,050 feet	13 Crew	26	New Iberia, LA	2	2	4.1	2	12	22.1
16,000 feet	7 Crew	14	Chalmette, LA	2	2	3	2	6	15
900 feet	1 Crew	2	Morgan City, LA	2	2	3	2	2	11
11,800 feet	5 Crew	10	Gonzales, LA	2	2	5	2	2	13
16,000 feet	7 Crew	14	Port Arthur, TX	2	2	9	2	6	21

Wildlife Response	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Deployment	Hrs to Deploy	Total Hrs
CGA											
Wildlife Support Trailer	NA	NA	NA	2	Harvey	2	2	3	1	2	10
Bird Scare Guns (24)	NA	NA	NA	2	Harvey	2	2	3	1	2	10
Bird Scare Guns (12)	NA	NA	NA	2	Galveston	2	2	12	1	2	19
Bird Scare Guns (12)	NA	NA	NA	2	Aransas Pass	2	2	16.5	1	2	23.5
Bird Scare Guns (48)	NA	NA	NA	2	Lake Charles	2	2	7	1	2	14
Bird Scare Guns (24)	NA	NA	NA	2	Leeville	2	2	2	1	2	9
Wildlife Rehabilitation	N/A	N/A	N/A	2	Lake Charles, LA	1	2	7	N/A	2	12

<b>Response Asset Totals</b>	<b>Total (bbls)</b>
Offshore EDRC	823,711
Offshore Recovered Oil Storage	1,407.796+
Nearshore / Shallow Water EDRC	272,589
Nearshore / Shallow Water Recovered Oil Storage	685,487+

*References*

Ji, Zhen-Gang, Walter R. Johnson, Charles F. Marshall, and Eileen M. Lear. 2004. Oil-Spill Risk Analysis: Contingency Planning Statistics for Gulf of Mexico OCS Activities. OCS Report 2004-026, Herndon, VA: U.S. Dept. of the Interior, Minerals Management Service, Environmental Division.

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**Appendix H: Coastal Zone Management Act (CZMA) Consistency Certification –**

<b>Title of Document:</b>	Initial Exploration Plan – Far South	<b>Document Number:</b>	GM001-DR-PLN-600-00375730
<b>Authority:</b>	Brenda Linster	<b>Revision</b>	0
<b>Custodian/Owner:</b>	Adalberto Garcia	<b>Issue Date:</b>	06/11/2024
<b>Retention Code:</b>	ADM3000	<b>Next Review Date (if applicable):</b>	
<b>Security Classification:</b>		<b>Page:</b>	Page 37 of 40
<b>Warning: Check DW Docs revision to ensure you are using the correct revision.</b>			

# Coastal Zone Management Consistency Certification State of Louisiana

Supplemental Exploration Plan (EP)

Type of OCS Plan

Green Canyon Block 584

Area and Block

OCS-G 36297

Lease Number

The proposed activities described in detail in this OCS Plan comply with Louisiana's approved Coastal Management Program and will be conducted in a manner consistent with such Program.

BP EXPLORATION & PRODUCTION INC.  
Lessee or Operator

Adalberto Garcia  
Certifying Official

06/11/2024  
Date

# Evaluation of Consistency with the Enforceable Policies of the Louisiana Coastal Resource Program

## 1 Background

BP Exploration & Production Inc. (bp) is submitting a Supplemental Exploration Plan (EP) for Green Canyon (GC) Block 584 (GC 584), Gulf of Mexico, Outer Continental Shelf (OCS)-G 36297. Under this EP, bp proposes to drill two production wells with surface locations and bottomhole locations in GC 584. The proposed primary wellbores seek to evaluate the Upper Miocene M81, M75U and M75L as target reservoirs. There is also potential for a production sidetrack from the M75L. The primary well locations 'A' and 'C' have alternate mirror locations 'B' and 'D', respectively, which are included only for re-spud purposes. These mirror locations ('B' and 'D') ultimately target the same production horizon and will encounter the same sands on the path to the targeted bottom-hole locations as their respective primary 'A' and 'C' well locations.

This document evaluates bp's EP for any reasonably foreseeable coastal effects on the land, water uses, or natural resources of the coastal zone of Louisiana, and evaluates the consistency of bp's EP with the enforceable policies of the Louisiana Coastal Resource Program (LCRP). The analysis, compliant with the Coastal Zone Management Act, is submitted pursuant to 15 Code of Federal Regulations (CFR) 930.76 and is supported by documentation provided in the Environmental Impact Analysis (EIA). The EIA provides an environmental impacts analysis for the drilling and subsea installation activities based on the location in GC 584 and is included in EP Appendix I. The EIA was prepared in accordance with applicable regulations, including 30 CFR 550.242 and 550.261 as well as Notice to Lessees and Operators (NTL) 2008-G04, extended by NTL BOEM 2015-N02, and BOEM 2015-N01.

The proposed activities will be conducted in accordance with BOEM, Bureau of Safety and Environmental Enforcement (BSEE), and U.S. Environmental Protection Agency regulations, applicable NTLs, conditions in the approved permits, and lease stipulations. Required federal permits will be obtained, and activities are expected to be conducted in compliance with such regulations, NTLs, conditions, and stipulations.

The proposed activities will occur in Federal OCS waters, approximately 116 statute miles (187 km) from the nearest Louisiana shoreline (**Figure 1**). A dynamically positioned (DP) drilling vessel is anticipated to be on site for up to 142 days per well for drilling and completion activities.

All land-based support activities, including transport to and from the site, will be from Louisiana. No new expansion of facilities or personnel for shorebases is anticipated to result from this exploration project. No significant impacts on the State of Louisiana are expected from routine activities as described in bp's EP.

Spill response-related activities for the proposed activities under bp's EP are governed by the bp Regional Oil Spill Response Plan (ROSRP) was filed on behalf of several affiliated companies, including BP Exploration & Production Inc. (Operator No. 02481). The ROSRP was confirmed in compliance and approved by BSEE on 6 November 2023. bp (Operator No. 02481) has demonstrated oil spill financial responsibility for the facilities proposed in the EP, according to 30 CFR Part 553 and NTL No. 2008-N05, "Guidelines for Oil Spill Financial Responsibility for Covered Facilities."

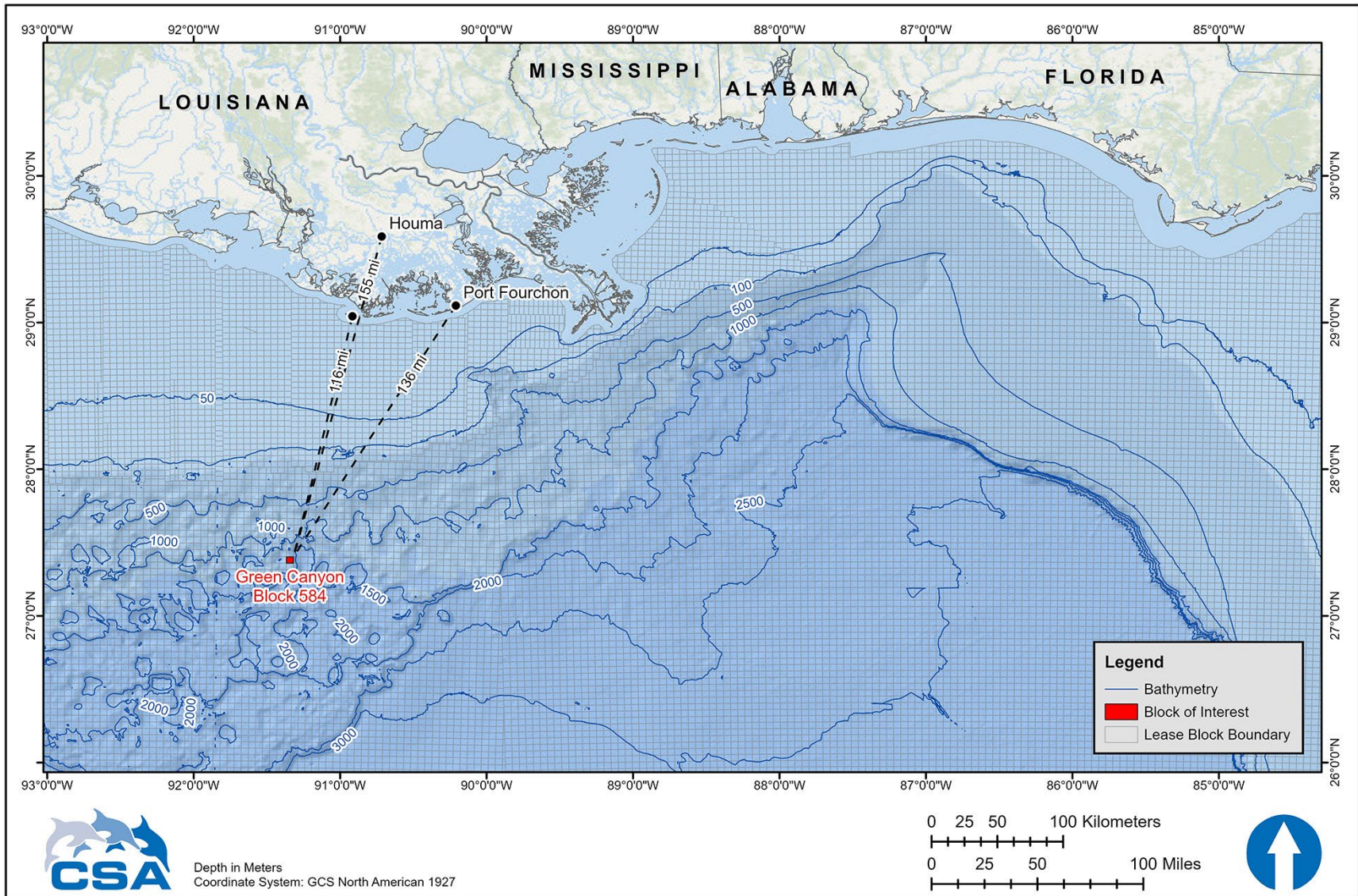


Figure 1. Location of Green Canyon Block 584 relative to the Louisiana shoreline and offshore bathymetric contours.

As discussed in Section A.9.2 of the EIA (Large Oil Spill [Worst Case Discharge]), the trajectory of a hypothetical spill in GC 584, projected using information in the 30-day Oil Spill Risk Analysis model for the Gulf of Mexico (see Ji et al., 2004), indicates there is up to a 4% conditional probability of a spill contacting the Louisiana shoreline (Cameron or Plaquemines Parish) within 30 days of a spill. Using Launch Point 45 (as indicated in Ji et al., 2004), the model predicts potential shoreline contact within 30 days of a spill ranging from Calhoun County, Texas to Plaquemines Parish, Louisiana.

## 2 Louisiana Coastal Resource Program Guidelines

Pursuant to the Louisiana State and Local Resources Management Act of 1978, as amended (Act 361, La. R.S. 49:214.21 et seq.), the Office of Coastal Management of the Louisiana Department of Natural Resources has created guidelines to implement the LCRP (LAC 43:I.Chapter 7). The guidelines are organized as a set of performance standards that are used to evaluate the impacts of a proposed action on coastal resources. All guidelines applicable to bp's proposed project in GC 584 are summarized in the following sections.

### §701. Guidelines Applicable to All Uses

- A. *The guidelines must be read in their entirety. Any proposed use may be subject to the requirements of more than one guideline or section of guidelines and all applicable guidelines must be complied with.*

The guidelines have been read in their entirety in preparation of this consistency analysis for the GC 584 project, and bp expects to comply with all applicable guidelines.

- B. *Conformance with applicable water and air quality laws, standards, and regulations, and with those other laws, standards and regulations which have been incorporated into the coastal resources program shall be deemed in conformance with the program except to the extent that these guidelines would impose additional requirements.*

Addressed in EP Sections 6, 7, and 8 and Appendix I.

- C. *The guidelines include both general provisions applicable to all uses and specific provisions applicable only to certain types of uses. The general guidelines apply in all situations. The specific guidelines apply only to the situations they address. Specific and general guidelines should be interpreted to be consistent with each other. In the event there is an inconsistency, the specific should prevail.*

The guidelines have been read in their entirety, and all applicable guidelines are summarized and addressed herein.

- F. *Information regarding the following general factors shall be utilized by the permitting authority in evaluating whether the proposed use is in compliance with the guidelines:*

1. *type, nature, and location of use;*
2. *elevation, soil, and water conditions and flood and storm hazard characteristics of site;*
3. *techniques and materials used in construction, operation, and maintenance of use;*
4. *existing drainage patterns and water regimes of surrounding area including flow, circulation, quality, quantity, and salinity; and impacts on them;*

5. *availability of feasible alternative sites or methods of implementing the use;*
6. *designation of the area for certain uses as part of a local program;*
7. *economic need for use and extent of impacts of use on economy of locality;*
8. *extent of resulting public and private benefits;*
9. *extent of coastal water dependency of the use;*
10. *existence of necessary infrastructure to support the use and public costs resulting from use;*
11. *extent of impacts on existing and traditional uses of the area and on future uses for which the area is suited;*
12. *proximity to and extent of impacts on important natural features such as beaches, barrier islands, tidal passes, wildlife and aquatic habitats, and forest lands;*
13. *the extent to which regional, state, and national interests are served including the national interest in resources and the siting of facilities in the coastal zone as identified in the coastal resources program;*
14. *proximity to, and extent of impacts on, special areas, particular areas, or other areas of particular concern of the state program or local programs;*
15. *likelihood of; and extent of impacts of; resulting secondary impacts and cumulative impacts;*
16. *proximity to and extent of impacts on public lands or works, or historic, recreational, or cultural resources;*
17. *extent of impacts on navigation, fishing, public access, and recreational opportunities;*
18. *extent of compatibility with natural and cultural setting; and*
19. *extent of long-term benefits or adverse impacts.*

Addressed in EP Sections 1, 5, and 9, and Appendix I.

G. *It is the policy of the coastal resources program to avoid the following adverse impacts. To this end, all uses, and activities shall be planned, sited, designed, constructed, operated, and maintained to avoid to the maximum extent practicable significant:*

1. *reductions in the natural supply of sediment and nutrients to the coastal system by alterations of freshwater flow;*
2. *adverse economic impacts on the locality of the use and affected governmental bodies;*
3. *detrimental discharges of inorganic nutrient compounds into coastal waters;*
4. *alterations in the natural concentration of oxygen in coastal waters;*
5. *destruction or adverse alterations of streams, wetland, tidal passes, inshore waters and water bottoms, beaches, dunes, barrier islands, and other natural biologically valuable areas or protective coastal features;*
6. *adverse disruption of existing social patterns;*
7. *alterations of the natural temperature regime of coastal waters;*
8. *detrimental changes in existing salinity regimes;*
9. *detrimental changes in littoral and sediment transport processes;*

10. *adverse effects of cumulative impacts;*
11. *detrimental discharges of suspended solids into coastal waters, including turbidity resulting from dredging;*
12. *reductions or blockage of water flow or natural circulation patterns within or into an estuarine system or a wetland forest;*
13. *discharges of pathogens or toxic substances into coastal waters;*
14. *adverse alteration or destruction of archaeological, historical, or other cultural resources;*
15. *fostering of detrimental secondary impacts in undisturbed or biologically highly productive wetland areas;*
16. *adverse alteration or destruction of unique or valuable habitats, critical habitat for endangered species, important wildlife or fishery breeding or nursery areas, designated wildlife management or sanctuary areas, or forestlands;*
17. *adverse alteration or destruction of public parks, shoreline access points, public works, designated recreation areas, scenic rivers, or other areas of public use and concern;*
18. *adverse disruptions of coastal wildlife and fishery migratory patterns;*
19. *land loss, erosion, and subsidence;*
20. *increases in the potential for flood, hurricane, and other storm damage, or increases in the likelihood that damage will occur from such hazards; and*
21. *reduction in the long-term biological productivity of the coastal ecosystem.*

Addressed in EP Sections 5 and 6, and Appendix I.

- I. *Uses shall to the maximum extent practicable be designed and carried out to permit multiple concurrent uses which are appropriate for the location and to avoid unnecessary conflicts with other uses of the vicinity.*

Addressed in EP Sections 1 and 2.

### **§703. Guidelines for Levees**

Not applicable.

### **§705. Guidelines for Linear Facilities**

Not applicable.

### **§707. Guidelines for Dredged Spoil Deposition**

Not applicable.

### **§709. Guidelines for Shoreline Modification**

Not applicable.

### **§711. Guidelines for Surface Alterations**

Not applicable. Surface alterations to shorebases are not required for this project.

### **§713. Guidelines for Hydrologic and Sediment Transport Modifications**

Not applicable.

### **§715. Guidelines for Disposal of Wastes**

- A. *The location and operation of waste storage, treatment, and disposal facilities shall be avoided in wetlands to the maximum extent practicable, and best practical techniques shall be used to minimize adverse impacts which may result from such use.*

Addressed in EP Sections 6 and 13, and Appendices F and I.

- B. *The generation, transportation, treatment, storage, and disposal of hazardous wastes shall be pursuant to the substantive requirements of the Department of Environmental Quality adopted pursuant to the provisions of R.S. 30:217, et seq.; as amended and approved pursuant to the Resource Conservation and Recovery Act of 1976 P.L. 94-580, as amended, and of the Office of Conservation for injection below surface.*

Addressed in EP Sections 6 and 13, and Appendices F and I.

- C. *Waste facilities located in wetlands shall be designed and built to withstand all expectable adverse conditions without releasing pollutants.*

Not applicable.

- D. *Waste facilities shall be designed and constructed using best practical techniques to prevent leaching, control leachate production, and prevent the movement of leachate away from the facility.*

Not applicable.

- E. *The use of overland flow systems for nontoxic, biodegradable wastes, and the use of sump lagoons and reservoirs utilizing aquatic vegetation to remove pollutants and nutrients shall be encouraged.*

Not applicable.

- F. *All waste disposal sites shall be marked and, to the maximum extent practicable, all components of waste shall be identified.*

Not applicable.

- G. *Waste facilities in wetlands with identifiable pollution problems that are not feasible and practical to correct shall be closed and either removed or sealed and shall be properly revegetated using the best practical techniques.*

Not applicable.

- H. *Waste shall be disposed of only at approved disposal sites.*

Addressed in EP Sections 6 and 13, and Appendices F and I.

- I. *Radioactive wastes shall not be temporarily or permanently disposed of in the coastal zone.*

Radioactive wastes may be generated during the completion phase of the project and are addressed in EP Sections 6 and 13, and Appendix F.

**§717. Guidelines for Uses that Result in the Alteration of Waters Draining into Coastal Waters**

Not applicable.

**§719. Guidelines for Oil, Gas, and Other Mineral Activities**

- A. *Geophysical surveying shall utilize the best practical techniques to minimize disturbance or damage to wetlands, fish and wildlife, and other coastal resources.*

Not applicable; all geophysical survey work related to this project was conducted on the OCS in GC 584, approximately 116 statute miles (187 km) from the nearest Louisiana shoreline. Geological and geophysical information is provided in EP Section 3.

- B. *To the maximum extent practicable, the number of mineral exploration and production sites in wetland areas requiring floatation access shall be held to the minimum number, consistent with good recovery and conservation practices and the need for energy development, by directional drilling, multiple use of existing access canals, and other practical techniques.*

Not applicable; all drilling activities related to this project will be conducted on the OCS in GC 584, approximately 116 statute miles (187 km) from the nearest Louisiana shoreline.

- C. *Exploration, production, and refining activities shall, to the maximum extent practicable, be located away from critical wildlife areas and vegetation areas. Mineral operations in wildlife preserves and management areas shall be conducted in strict accordance with the requirements of the wildlife management body.*

Addressed in EP Sections 1, 5, and 9, and Appendix I. No activities will be conducted in wildlife preserves or management areas. All drilling activities related to this project will be conducted on the OCS in GC 584. Shore-based support will originate from Louisiana. The nearest Louisiana shoreline is approximately 116 statute miles (187 km) from the project area.

During a large-scale incident, a few of Louisiana's Wildlife Refuges, Wilderness Areas, State Parks, and other protected areas that could potentially be affected by oiling within 30 days of a large spill (per the 30-day Oil Spill Risk Analysis presented by Ji et al., 2004). Potentially affected areas, along with the natural resources found in each area, are provided in **Table 1**.

- D. *Mineral exploration and production facilities shall be to the maximum extent practicable designed, constructed, and maintained in such a manner to maintain natural water flow regimes, avoid blocking surface drainage, and avoid erosion.*

Not applicable; all drilling activities related to this project will be conducted on the OCS in GC 584, approximately 116 statute miles (187 km) from the nearest Louisiana shoreline.

- E. *Access routes to mineral exploration, production, and refining sites shall be designed and aligned so as to avoid adverse impacts on critical wildlife and vegetation areas to the maximum extent practicable.*

Addressed in EP Sections 12 and 13, and Appendix I.

- F. *Drilling and production sites shall be prepared, constructed, and operated using the best practical techniques to prevent the release of pollutants or toxic substances into the environment.*

Addressed in EP Sections 1, 2, 8, and 9.

- G. *All drilling activities, supplies, and equipment shall be kept on barges, on drilling rigs, within ring levees, or on the well site.*

Addressed in EP Section 1.

- H. *Drilling ring levees shall to the maximum extent practicable be replaced with small production levees or removed entirely.*

Not applicable; no drilling ring levees will be used during the proposed activities.

- I. *All drilling, and production equipment, structures, and storage facilities shall be designed and constructed utilizing best practical techniques to withstand all expectable adverse conditions without releasing pollutants.*

Addressed in EP Sections 1 and Appendix I.

- J. *Mineral exploration, production, and refining facilities shall be designed and constructed using best practical techniques to minimize adverse environmental impacts.*

Addressed in EP Sections 1 and 2, and Appendix I.

- K. *Effective environmental protection and emergency or contingency plans shall be developed and complied with for all mineral operations.*

Addressed in EP Sections 1, 2, 3, and 8, and Appendices G and I.

- L. *The use of dispersants, emulsifiers, and other similar chemical agents on oil spills is prohibited without the prior approval of the Coast Guard or Environmental Protection Agency on-scene coordinator, in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan.*

Addressed in EP Appendix I.

- M. *Mineral exploration and production sites shall be cleared, revegetated, detoxified, and otherwise restored as near as practicable to their original condition upon termination of operations to the maximum extent practicable.*

Addressed in EP Section 1 and Appendix I.

- N. *The creation of underwater obstructions which adversely affect fishing or navigation shall be avoided to the maximum extent practicable.*

Addressed in EP Section 1.

Table 1. Louisiana Wildlife Refuges, Wilderness Areas, State Parks, and other protected areas and natural resources within the geographic range of potential shoreline oil contact within 30 days of a large discharge event based on Oil Spill Risk Analysis Launch Point 46 (as referenced from Ji et al., 2004).

Wildlife Refuge, Wilderness Area, State or National Park	Resource Description
Cameron Parish	
Lacassine National Wildlife Refuge (NWR)	Established in 1937, Lacassine NWR is approximately 35,000 acres of freshwater marsh. Approximately half of the acreage of the NWR is natural freshwater marsh and open water. Notable wildlife includes nesting colonies of wading and water birds, alligators, eagles, falcons, and Louisiana black bears as well as wintering populations of several species of ducks. The NWR is known for vast numbers of pintails congregating each winter. The NWR is available for a multitude of recreational opportunities, including fishing, hunting, boating, and hiking (U.S. Fish and Wildlife Service [USFWS], n.d. - 1).
Peveto Woods Bird and Wildlife Sanctuary	A bird sanctuary owned by the Baton Rouge Audubon Society; this sanctuary is a 40-acre tract of coastal land in Cameron Parish. During the spring and fall migrations, the sanctuary is home to numerous species of songbirds. It is estimated that nearly 2 million birds seek refuge in the sanctuary each year before and after their trans-Gulf migrations. The sanctuary is also used by numerous species of butterflies, including the migratory Monarch butterfly (Baton Rouge Audubon Society, 2022).
Rockefeller Wildlife Refuge and Game Preserve	Rockefeller Wildlife Refuge, located in eastern Cameron and western Vermilion Parishes, is owned, and maintained by the State of Louisiana. The refuge is a flat, treeless area with highly organic soils that are capable of producing immense quantities of waterfowl foods in the form of annual emergent and submerged aquatics. When deeded to the state, the refuge encompassed approximately 86,000 acres, but beach erosion has taken a heavy toll, and the most recent surveys indicate only 76,042 acres remain. This area borders the Gulf of Mexico for 26.5 miles and extends inland toward the Grand Chenier Ridge, a stranded beach ridge 6 miles (10 km) from the Gulf of Mexico. Common resident animals include Mottled Ducks, nutria, muskrat, rails, raccoon, mink, otter, opossum, white-tailed deer, and alligators. An abundant fisheries population provides recreational opportunities to fishermen seeking shrimp, redfish, speckled trout, black drum, and largemouth bass, among others (Louisiana Department of Wildlife and Fisheries, n.d. – a).
Sabine NWR	Sabine NWR includes 124,511 acres of fresh, intermediate, and brackish marshes that provide habitat for waterfowl and other birds. Designated as an Internationally Important Bird Area, the refuge is known to provide habitat for more than 300 species of birds, 26 species of mammals, 41 species of reptiles and amphibians, 132 species of fish, and 68 species of marine invertebrates. Common bird species include Mottled Ducks, Great Egrets, Neotropic Cormorants, Snowy Egrets, and various species of wading birds and shorebirds. American alligators are known to be very common in the refuge as well (USFWS, n.d. - b).

Table 1. (Continued).

Wildlife Refuge, Wilderness Area, State or National Park	Resource Description
<b>Vermilion Parish</b>	
Paul J. Rainey Wildlife Refuge and Game Preserve	Paul J. Rainey Wildlife Refuge and Game Preserve is a privately owned 26,000-acre coastal wetland in Vermilion Parish owned by the National Audubon Society. Formerly open to gas drilling, hydrocarbon exploration ended in 1999. Notable faunae include deer, muskrats, otters, geese, and numerous other species of birds. No hunting or fishing is currently allowed in the Preserve (National Audubon Society, n.d.).
Rockefeller Wildlife Refuge and Game Preserve	See description under Cameron Parish.
State Wildlife Refuge	State Wildlife Refuge is a 13,000-acre tract owned by the State of Louisiana. Located on the southwest shore of Vermilion Bay, the focus of the refuge is on natural resource conservation. The refuge is an important waterfowl wintering area and serves as habitat for numerous species of shorebirds, wading birds, alligators, shrimp, fish, and crabs. Mammals such as raccoons, muskrats, nutria, mink, and deer are common as well (Louisiana Department of Wildlife and Fisheries, n.d. – b).
<b>Iberia Parish</b>	
Shell Key National Wildlife Refuge	Shell Keys National Wildlife Refuge has supported large-but-limited colonies of nesting seabirds. Because of erosion from hurricanes and other storms only one islet, composed almost entirely of seashells, remains. Birds known to nest here include royal terns, sandwich terns, black skimmers and laughing gulls. In addition, the islet is used as a loafing area by white pelicans, brown pelicans, terns and gulls. Storms have eroded the island to such an extent that no known nesting has occurred since 1992 (USFWS, n.d. - c).
Marsh Island Wildlife Refuge	Marsh Island is close to 71,000 acres; it currently measures approximately 20 miles east to west and 11 miles north to south. Habitat on this refuge is mainly brackish to intermediate marsh and flat, with very few remaining trees. Marsh Island is an extremely important refuge as it supports a wide array of animal species throughout the year. The island serves as crucial wintering habitat to numerous waterfowl, wading and shorebirds, and birds of prey. This refuge also serves as essential habitat for commercially important fish species, as well as alligators and furbearers. In the Vermilion Bay area, much of the recreational and commercial harvests of shrimp and blue crab depend on the nursery habitats provided by Marsh Island (Louisiana Department of Wildlife and Fisheries, n.d. - c).
<b>Terrebonne Parish</b>	
Isle Dernieres Barrier Islands Refuge	This refuge is made up of three barrier islands offshore of Terrebonne Parish: Wine Island, Whiskey Island, and Raccoon Island, for a total of approximately 630 acres. The primary management goal of the refuge is to provide and protect habitat for nesting waterbirds. Raccoon Island is one of the most important waterbird nesting sites on the Gulf coast (Louisiana Department of Wildlife and Fisheries, n.d. – d).
Mandalay NWR	Mandalay NWR was established in 1996 as 4,419 acres of freshwater marsh and cypress-tupelo swamp. Access to the refuge is by boat only. Popular activities in the refuge include wildlife observation, boating, fishing, and hunting. The refuge proves important habitat for wintering waterfowl of the Mississippi flyway. Other notable wildlife includes ducks, white tailed deer, alligators, and numerous bird species, including herons, egrets, and eagles (USFWS, n.d. - d).

Table 1. (Continued).

Wildlife Refuge, Wilderness Area, State or National Park	Resource Description
Point-aux-Chenes Wildlife Management Area (WMA)	Point-aux-Chenes WMA is a 35,000-acre marshland owned and operated by the Louisiana Department of Wildlife and Fisheries. Access to the WMA typically is limited to boats as there are no roads through the marshland. Notable game species present in the WMA include waterfowl, deer, rabbit, squirrels, rails, gallinules, and snipe. Both saltwater and freshwater fishing in the WMA is considered excellent due to the nearby Timbalier and Terrebonne Bay watersheds. Annual lotteries are held by the Louisiana Department of Wildlife and Fisheries for a waterfowl hunt exclusively for physically challenged hunters and a deer hunt for youth (Louisiana Department of Wildlife and Fisheries, n.d. - e).
Lafourche Parish	
Wisner WMA	Owned by the Edward Wisner Donation Advisory Committee, the WMA is approximately 21,000 acres of bayous and canals. The WMA is open seasonally for small game and waterfowl hunting.
Point-aux-Chenes WMA	See description under Terrebonne Parish.
Plaquemines Parish	
Delta NWR	The Delta NWR was established in 1935 and covers 49,000 acres formed by the deposition of sediment from the Mississippi River. Its lush vegetation is the food source for a multitude of fish, waterfowl, and animals. The Delta NWR is the winter home for hundreds of thousands of snow geese, coots, and ducks. Endangered and threatened species in the NWR include the Piping Plover and the American alligator, which was de-listed as an endangered species in 1987 but remains listed as threatened due to similarity in appearance to the endangered American crocodile. The Delta NWR supports a wide variety of non-listed wildlife species. Tens of thousands of wintering waterfowl utilize the food resources found in the Delta NWR. Large numbers of other bird species can be found in the NWR, with numbers peaking during the spring and fall migrations. Large numbers of wading birds nest on the refuge, and thousands of shorebirds can be found on tidal mudflats and deltaic splays. Numerous furbearers and game mammals are year-round residents, and the marshes and waterways provide year-round and seasonal habitat for a diversity of fish and shellfish species (USFWS, n.d. - e).
Pass-a-Loutre WMA	The Pass-a-Loutre WMA is located in southern Plaquemines Parish at the mouth of the Mississippi River, approximately 10 miles (16 km) south of Venice and is accessible only by boat. The area is characterized by river channels with attendant channel banks, natural bayous, and man-made canals interspersed with intermediate and fresh marshes. The area is owned by the Louisiana Department of Wildlife and Fisheries and encompasses approximately 115,000 acres. The area is home to numerous species of shorebirds and other waterfowl. Alligators and small mammals are abundant. The inland waters provide habitat for fish, shrimp, and crabs (Louisiana Department of Wildlife and Fisheries, n.d. - f).

Table 1. (Continued).

Wildlife Refuge, Wilderness Area, State or National Park	Resource Description
Breton NWR	<p>Established in 1904, the Breton NWR is the second oldest NWR in the United States. Historically, the Breton NWR has been the site of a lighthouse station (destroyed by Hurricane Katrina), a quarantine station, a small fishing village, and an oil production facility. The Chandeleur Islands (where Breton NWR is located) are designated as critical habitat (as defined by the National Marine Fisheries Service) for the endangered Piping Plover, which is a common visitor to the refuge during fall, winter, and spring. The Western Gulf Coast population of Brown Pelicans was de-listed under the Endangered Species Act in 2009. The Brown Pelican is a year-round resident of southeast Louisiana, and the Breton NWR serves as important breeding grounds for these birds. The Breton NWR also provides habitat for colonies of nesting wading birds and seabirds as well as wintering shorebirds and waterfowl. Twenty-three species of seabirds and shorebirds frequently use the refuge, and 13 species nest on the various islands. The most abundant nesters are Brown Pelicans, Laughing Gulls, Royal Gulls, and Caspian and Sandwich Terns. Waterfowl winter near the refuge islands and use the adjacent shallows, marshes, and sounds for feeding and for protection during inclement weather. Redheads and Lesser Scaup account for the majority of waterfowl on the refuge. Other wildlife species found in the NWR include nutria, raccoons, and several species of sea turtles (USFWS, n.d. - f).</p>

### 3 Consistency Certification

The analysis indicates that bp's EP for GC 584 is consistent with the enforceable policies of the LCRP according to the guidelines provided by the LCRP. Routine operations will have limited environmental impacts in the immediate vicinity of the drilling activities. Land-based support activities will originate from Louisiana.

In the event of an accidental spill, bp will implement the measures of its ROSRP, which details plans and procedures for containment, recovery, and removal of an oil spill. This project is expected to conform to existing regulatory requirements. The EP describes the project and related activities, and the EIA analyzes potential environmental impacts from an unplanned release. The intent and requirements of enforceable Louisiana Statutes have been considered and discussed as well as other information requirements of Louisiana. A Coastal Zone Management Act consistency certification according to 16 U.S.C. 1456(c)(3)(B) and 15 CFR 930.76(c) for Louisiana is provided on the cover page.

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## Appendix I: Environmental Impact Analysis (EIA) –

<b>Title of Document:</b>	Initial Exploration Plan – Far South	<b>Document Number:</b>	GM001-DR-PLN-600-00375730
<b>Authority:</b>	Brenda Linster	<b>Revision</b>	0
<b>Custodian/Owner:</b>	Adalberto Garcia	<b>Issue Date:</b>	06/11/2024
<b>Retention Code:</b>	ADM3000	<b>Next Review Date (if applicable):</b>	
<b>Security Classification:</b>		<b>Page:</b>	Page 38 of 40
<b>Warning: Check DW Docs revision to ensure you are using the correct revision.</b>			

# **Environmental Impact Analysis**

for a

Supplemental Exploration Plan (EP)  
for  
Green Canyon Block 584 (OCS-G-36297)  
Offshore Louisiana

June 2024

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## Acronyms and Abbreviations

§	section	NH <sub>3</sub>	ammonia
μPa	micropascal	NMFS	National Marine Fisheries Service
ac	acre		
bbl	barrel	NOAA	National Oceanic and Atmospheric Administration
BOEM	Bureau of Ocean Energy Management	NO <sub>x</sub>	nitrogen oxides
BOEMRE	Bureau of Ocean Energy Management, Regulation and Enforcement	NPDES	National Pollutant Discharge Elimination System
BOP	blowout preventer	NTL	Notice to Lessees and Operators
BOPD	barrels of oil per day	NWR	National Wildlife Refuge
bp	bp Exploration & Production Inc.	OCS	Outer Continental Shelf
BSEE	Bureau of Safety and Environmental Enforcement	OSRA	Oil Spill Risk Analysis
CH <sub>4</sub>	methane	PAH	polycyclic aromatic hydrocarbons
CO	carbon monoxide	Pb	lead
CO <sub>2</sub>	carbon dioxide	PBR	potential biological removal
CFR	Code of Federal Regulations	PK	zero-to-peak sound pressure level
dB	decibel	PM	particulate matter
DP	dynamically positioned	re	referenced to
DPS	distinct population segment	ROSRP	Regional Oil Spill Response Plan
EEZ	Exclusive Economic Zone	SBM	synthetic-based drilling muds
EFH	Essential Fish Habitat	SEL <sub>24h</sub>	sound exposure level over 24 hours
EIA	Environmental Impact Analysis	SO <sub>x</sub>	sulfur oxides
EIS	Environmental Impact Statement	SPL	root-mean-square sound pressure level
EP	Exploration Plan	SWSS	Sperm Whale Seismic Study
ESA	Endangered Species Act	USCG	U.S. Coast Guard
FAD	fish aggregating device	USEPA	U.S. Environmental Protection Agency
FR	<i>Federal Register</i>		
GC	Green Canyon	USFWS	U.S. Fish and Wildlife Service
GPS	global positioning system	VOC	volatile organic compound
GMFMC	Gulf of Mexico Fishery Management Council	WCD	worst case discharge
H <sub>2</sub> S	hydrogen sulfide		
ha	hectare		
HAPC	Habitat Area of Particular Concern		
Hz	hertz		
IPF	impact-producing factor		
IMT	Incident Management Team		
kHz	kilohertz		
MARPOL	International Convention for the Prevention of Pollution from Ships		
MMC	Marine Mammal Commission		
MMPA	Marine Mammal Protection Act		
MMS	Minerals Management Service		
NAAQS	National Ambient Air Quality Standards		

## Introduction

BP Exploration & Production Inc. (bp) is submitting a supplemental exploration plan (EP) for Green Canyon (GC) Block 584 (GC 584), Gulf of Mexico, Outer Continental Shelf (OCS)-G-36297. Under this EP, bp proposes to drill two wells with surface locations and bottomhole locations in Green Canyon Block 584. The proposed primary wellbores seek to evaluate the Upper Miocene M81, M75U and M75L as target reservoirs. There is also potential for a production sidetrack from the M75L. The primary well locations 'A' and 'C' have alternate mirror locations 'B' and 'D', respectively, which are included only for re-spud purposes. These mirror locations ('B' and 'D') ultimately target the same production horizon and will encounter the same sands on the path to the targeted bottom-hole locations as their respective primary 'A' and 'C' well locations.

GC 584 is located within the Central Gulf of Mexico OCS Planning Area, approximately 116 statute miles (187 kilometers [km]) from the nearest shoreline (Plaquemines Parish, Louisiana), 136 statute miles (219 km) from the regional onshore support base (Port Fourchon, Louisiana), and 155 statute miles (249 km) from the helicopter base at Houma, Louisiana (**Figure 1**). The water depth at the proposed project location is approximately 1,247 to 1,284 m (4,094 to 4,211 ft). A dynamically positioned (DP) drillship is anticipated to be on site for no more than 142 days per well for well drilling and completion activities.

The Environmental Impact Analysis (EIA) for this EP was prepared for submittal to the Bureau of Ocean Energy Management (BOEM) in accordance with applicable regulations, including Title 30 Code of Federal Regulations (CFR) section (§) 550.242 and § 550.261. The EIA is a project- and site-specific analysis of the potential environmental impacts of bp's planned activities. The EIA complies with guidance provided in existing Notices to Lessees and Operators (NLTs) issued by BOEM and its predecessors, Minerals Management Service (MMS) and Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE), including NLTs 2008-G04 (extended by 2015-N02) and 2015-N01. Potential impacts have been analyzed at a broader level in the 2024-2029 Programmatic Environmental Impact Statement (EIS) for the OCS Oil and Gas Leasing Program (BOEM, 2023a) and in multisale EISs for the Western and Central Gulf of Mexico Planning Areas (BOEM, 2012a,b; 2013; 2014a; 2015; 2016b; 2017; 2023b). The most recent multisale EIS contains updated environmental baseline information in light of the Macondo (*Deepwater Horizon*) incident and addresses potential impacts of a catastrophic spill (BOEM, 2012a,b; 2013; 2014a; 2015; 2016b; 2017). The National Marine Fisheries Service (NMFS) Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico assesses impacts and requires additional mitigation measures for protected species (NMFS, 2020a). The analyses and relevant information from those documents are incorporated in this EIA by reference.

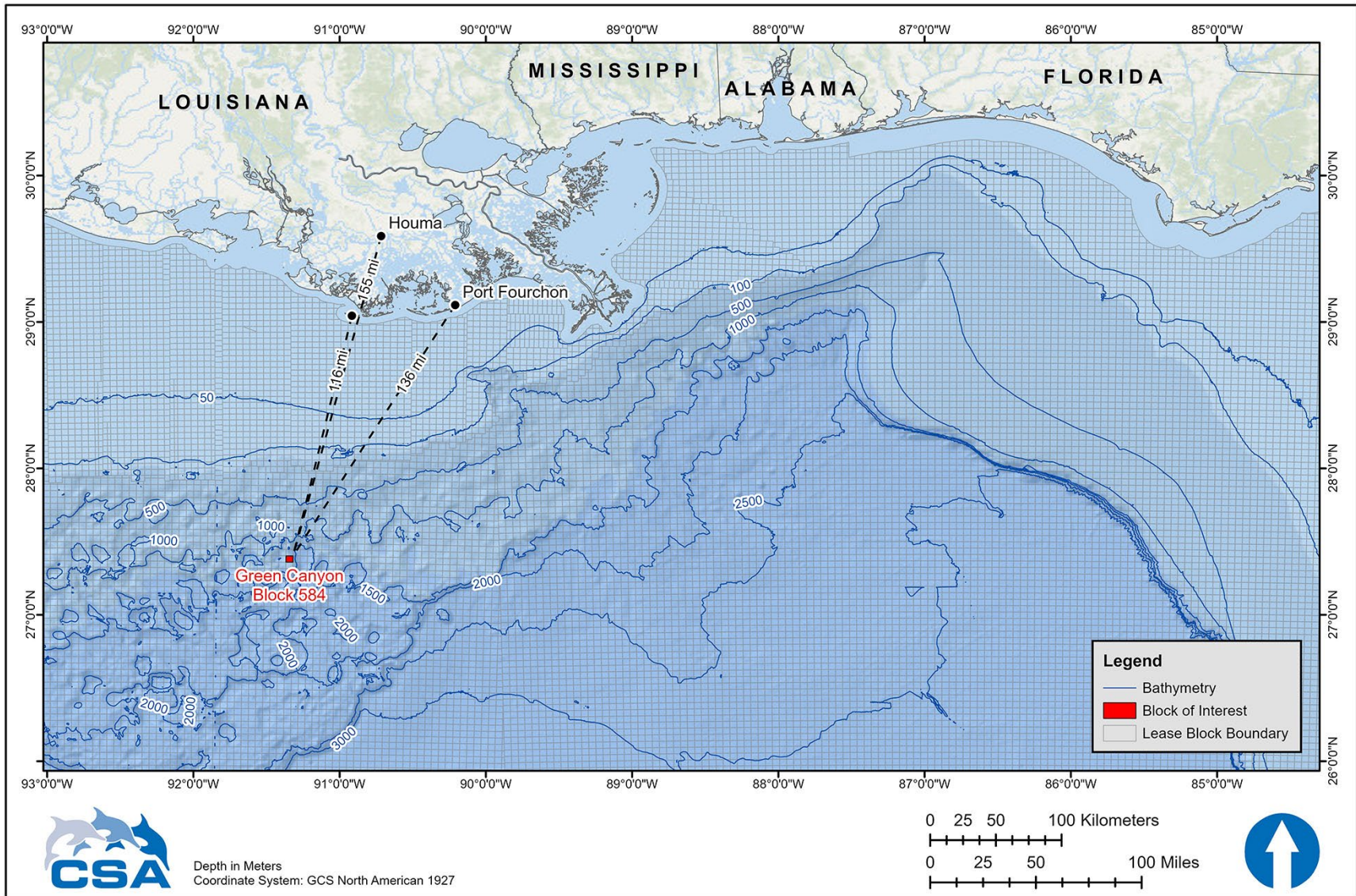


Figure 1. Location of Green Canyon Block 584 relative to the Louisiana shoreline and offshore bathymetric contours.

Oil spill response-related activities for the well to be drilled under this EP are governed by the bp Regional Oil Spill Response Plan (ROSRP), as filed by BP America Inc. (Operator No. 21372) under cover letter dated 10 April 2023. The ROSRP was filed on behalf of several affiliated companies, including BP Exploration & Production Inc. (Operator No. 02481). The ROSRP was confirmed in compliance and approved by the Bureau of Safety and Environmental Enforcement (BSEE) on 30 May 2023. The bp ROSRP should meet the requirements contained in 30 CFR Part 254 and as operator, bp (Operator No. 02481) has demonstrated oil spill financial responsibility for the facilities proposed in this EP, according to 30 CFR Part 553 and NTL No. 2008-N05, “Guidelines for Oil Spill Financial Responsibility for Covered Facilities.” The bp ROSRP details the plan for response to manage oil spills that may result from drilling and production operations with a designed response program based on regional capabilities to address spills ranging from small operations-related spills to a worst-case discharge (WCD) from a well blowout. The program, as detailed in bp’s ROSRP is intended to meet requirements of the relevant coastal states and applicable federal oil spill planning regulations. It also includes information regarding bp’s incident management team (IMT) and dedicated response assets, potential spill risks, and local environmentally sensitive areas. The ROSRP describes personnel and equipment mobilization, the IMT organization, and an overview of strategies, actions and notifications to be taken in the event of a spill.

The EIA is organized into **Sections A through I** corresponding to the information required by NTLs 2008-G04 and 2015-N01. The main impact-related discussions are in **Section A** (Impact-Producing Factors) and **Section C** (Impact Analysis). **Table 1** lists and summarizes the NTLs applicable to the EIA.

Table 1. Notices to Lessees and Operators (NTLs) applicable to the Environmental Impact Analysis (EIA).

NTL	Title	Summary
BOEM-2023-G01	Expanded Rice’s Whale Protection Efforts During Reinitiated Consultation with NMFS	Provides recommendations and guidance for operators for suggested measures to expand protections for the Rice’s whale while BOEM and BSEE are involved in consultation with NMFS on the amended 2020 Biological Opinion. The NTL guidance applies to the Expanded Rice’s Whale Area, comprising the entire northern Gulf of Mexico between the 100 and 400 m isobaths.
BOEM-2020-G01	Air Quality Information Requirements for Exploration Plans, Development Operations Coordination Documents, and Development and Production Plans in the Gulf of Mexico Region	Cancels and supersedes the air emission information portion of NTL 2008-G04, Information Requirement for Exploration Plans and Development Operations Coordination Documents, effective date May 5, 2008.
BOEM-2016-G01 or Appendix C (NMFS, 2020a, 2021a)	Vessel Strike Avoidance and Injured/Dead Protected Species Reporting	Recommends protected species identification training; recommends that vessel operators and crews maintain a vigilant watch for marine mammals and slow down or stop their vessel movement to avoid colliding with protected species; and requires operators to report sightings of any injured or dead protected species. Reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) replaces compliance with this NTL.

Table 1. (Continued).

NTL	Title	Summary
BOEM-2016-G02 or Appendix A (NMFS, 2020a)	Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program	Summarizes seismic survey mitigation measures, updates regulatory citations, and provides clarification on how the measures identified in the NTL will be used by BOEM, BSEE, and operators in order to comply with the Endangered Species Act and the Marine Mammals Protection Act. Reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) replaces compliance with this NTL.
2015-G03 or Appendix B (NMFS 2020a)	Marine Trash and Debris Awareness and Elimination	Instructs operators to exercise caution in the handling and disposal of small items and packaging materials; requires the posting of instructional placards at prominent locations on offshore vessels and structures; and mandates a yearly marine trash and debris awareness training and certification process.
BOEM 2015-N02	Elimination of Expiration Dates on Certain Notices to Lessees and Operators Pending Review and Reissuance	Eliminates expiration dates (past or upcoming) of all NTLs currently posted on the BOEM website.
BOEM 2015-N01	Information Requirements for Exploration Plans, Development and Production Plans, and Development Operations Coordination Documents on the OCS for Worst Case Discharge (WCD) and Blowout Scenarios	Provides guidance regarding information required in WCD descriptions and blowout scenarios.
BOEM 2014-G04	Military Warning and Water Test Areas	Provides contact links to individual command headquarters for the military warning and water test areas in the Gulf of Mexico.
BSEE 2014-N01	Elimination of Expiration Dates on Certain Notices to Lessees and Operators Pending Review and Reissuance	Eliminates expiration dates (past or upcoming) of all NTLs currently posted on the BSEE website.
BSEE-2012-N06	Guidance to Owners and Operators of Offshore Facilities Seaward of the Coast Line Concerning Regional Oil Spill Response Plans	Provides clarification, guidance, and information for preparation of regional Oil Spill Response Plans. Recommends description of response strategy for worst-case discharge scenarios to ensure capability to respond to oil spills is both efficient and effective.
2010-N10	Statement of Compliance with Applicable Regulations and Evaluation of Information Demonstrating Adequate Spill Response and Well Containment Resources	Informs operators using subsea blowout preventers (BOPs) or surface BOPs on floating facilities that applications for well permits must include a statement signed by an authorized company official stating that the operator will conduct all activities in compliance with all applicable regulations, including the increased safety measures regulations (75 <i>Federal Register</i> [FR] 63346). Informs operators that BOEM will be evaluating whether each operator has submitted adequate information demonstrating that it has access to and can deploy containment resources to respond promptly to a blowout or other loss of well control.

Table 1. (Continued).

NTL	Title	Summary
2009-G40	Deepwater Benthic Communities	Provides guidance for avoiding and protecting high-density deepwater benthic communities (including chemosynthetic and deepwater coral communities) from damage caused by OCS oil and gas activities in water depths greater than 300 m (984 ft). Prescribes separation distances of 610 m (2,000 ft) from each mud and cuttings discharge location and 76 m (250 ft) from all other seafloor disturbances.
2009-G39	Biologically Sensitive Underwater Features and Areas	Provides guidance for avoiding and protecting biologically sensitive features and areas (i.e., topographic features, pinnacles, low relief live bottom areas, and other potentially sensitive biological features) when conducting OCS operations in water depths less than 300 m (984 ft) in the Gulf of Mexico.
2008-G04	Information Requirements for Exploration Plans and Development Operations Coordination Documents	Provides guidance on information requirements for OCS plans, including EIA requirements and information regarding compliance with the provisions of the Endangered Species Act and Marine Mammal Protection Act.
2008-N05	Guidelines for Oil Spill Financial Responsibility (OSFR) for Covered Facilities	Provides clarification and guidance to operators/lessees on policies for submitting required OSFR documents to the Gulf of Mexico OCS Region as required under 30 CFR Part 253.
2005-G07	Archaeological Resource Surveys and Reports	Provides guidance on regulations regarding archaeological discoveries, specifies requirements for archaeological resource surveys and reports, and outlines options for protecting archaeological resources. Reissued in June 2020 to comply with Executive Order 13891 of 9 October 2019 and to rescind NTL 2011-JOINT-G01.

BOEM = Bureau of Ocean Energy Management; BSEE = Bureau of Safety and Environmental Enforcement; NMFS = National Marine Fisheries Service; OCS = Outer Continental Shelf.

## A. Impact-Producing Factors

Based on the description of bp’s proposed activities, a series of impact-producing factors (IPFs) have been identified as presented in **Table 2**. **Table 2** provides a matrix of environmental resources that may be affected in the left column and sources of impacts (i.e., IPFs) associated with the proposed project across the top. **Table 2**, adapted from Form BOEM-0142, has been developed *a priori* to focus the impact analysis on those environmental resources that may be impacted as a result of one or more IPFs. The tabular matrix indicates which of the routine activities and accidental events could affect specific resources. An “X” indicates that an IPF could reasonably be expected to affect a certain resource, and a dash (--) indicates no impact or negligible impact (**Table 2**). Where there may be an effect, an impact analysis by resource is provided in **Section C**. Potential IPFs for the proposed activities are listed below and briefly discussed in the following sections:

- Drilling rig presence (including sound and lights);
- Physical disturbance to the seafloor;
- Air pollutant emissions;
- Effluent discharges;
- Water intake;
- Onshore waste disposal;
- Marine debris;
- Support vessel and helicopter traffic (includes vessel collisions with resources and marine sound); and
- Accidents.

### A.1 Drilling Rig Presence, Marine Sound, and Lights

The activities proposed in this EP will be completed using DP vessels. DP vessels use a global positioning system (GPS), specific computer software, and sensors in conjunction with a series of thrusters to maintain position. Through satellite navigation and position reference sensors, the location of the drilling rig is precisely monitored while thrusters, positioned at various locations about the rig pontoons, are activated to maintain position. This allows operations at sea in areas where mooring or anchoring may not be best suited or feasible. Consequently, there will be no anchoring during this project. The selected drilling rig is expected to be on site for up to 142 days. The drilling rig will maintain exterior lighting in accordance with applicable federal navigation and aviation safety regulations (International Regulations for Preventing Collisions at Sea, 1972 [72 COLREGS], Part C).

Potential impacts to marine resources from the drilling rig vessel include the physical presence of the drilling rig in the ocean, entanglement and entrapment from moon pools and equipment in the water, working and safety lighting on the rig, and underwater sound produced during drilling operations.

During the physical presence of the drilling rig activities there may be occasions where equipment may be suspended in the water column. Entanglement and entrapment of protected species can occur from equipment with slack or looping lines and cables in the water. Marine mammals and sea turtles can become entangled in vessel lines in the water with loops or sufficient looping to trap the animals if they come into contact with them. Entanglement and entrapment can be minimized with proper maintenance of equipment lines in the water by encasing flexible lines, removing excess lines, and keeping lines taught to remove slack and line loops.

Table 2. Matrix of impact-producing factors (IPF) and affected environmental resources.

Environmental Resources	Impact-Producing Factors									
	Drilling Rig Presence (incl. sound & lights)	Physical Disturbance to Seafloor	Air Pollutant Emissions	Effluent Discharges	Water Intake	Onshore Waste Disposal	Marine Debris	Support Vessel/ Helicopter Traffic	Accidents	
									Small Fuel Spill	Large Oil Spill
<b>Physical/Chemical Environment</b>										
Air quality	--	--	X	--	--	--	--	--	X(6)	X(6)
Water quality	--	--	--	X	--	--	--	--	X(6)	X(6)
<b>Seafloor Habitats and Biota</b>										
Soft bottom benthic communities	--	X	--	X	--	--	--	--	--	X(6)
High-density deepwater benthic communities	--	--(4)	--	--(4)	--	--	--	--	--	X(6)
Designated topographic features	--	--(1)	--	--(1)	--	--	--	--	--	--
Pinnacle trend area live bottoms	--	--(2)	--	--(2)	--	--	--	--	--	--
Eastern Gulf live bottoms	--	--(3)	--	--(3)	--	--	--	--	--	--
<b>Threatened, Endangered, and Protected Species and Critical Habitat</b>										
Sperm whale (Endangered)	X(8)	--	--	--	--	--	--	X(8)	X(6,8)	X(6,8)
Rice's whale (Endangered)	X(8)	--	--	--	--	--	--	X(8)	X(6,8)	X(6,8)
West Indian manatee (Threatened)	--	--	--	--	--	--	--	X(8)	--	X(6,8)
Non-endangered marine mammals (protected)	X	--	--	--	--	--	--	X	X(6)	X(6)
Sea turtles (Endangered/Threatened)	X(8)	--	--	--	--	--	--	X(8)	X(6,8)	X(6,8)
Piping Plover (Threatened)	--	--	--	--	--	--	--	--	--	X(6)
Whooping Crane (Endangered)	--	--	--	--	--	--	--	--	--	X(6)
Black-capped Petrel	X	--	--	--	--	--	--	X(8)	X(6,8)	X(6,8)
Rufa Red Knot	--	--	--	--	--	--	--	X(8)	X(6,8)	X(6,8)
Oceanic whitetip shark (Threatened)	X	--	--	--	--	--	--	--	--	X(6)
Giant manta ray (Threatened)	X	--	--	--	--	--	--	--	--	X(6)
Gulf sturgeon (Threatened)	--	--	--	--	--	--	--	--	--	X(6)
Nassau grouper (Threatened)	--	--	--	--	--	--	--	--	--	X(6)
Smalltooth sawfish (Endangered)	--	--	--	--	--	--	--	--	--	X(6)
Beach mice (Endangered)	--	--	--	--	--	--	--	--	--	X(6)
Florida salt marsh vole (Endangered)	--	--	--	--	--	--	--	--	--	X(6)
Panama City Crayfish (Threatened)	--	--	--	--	--	--	--	--	--	X(6)
Threatened coral	--	--	--	--	--	--	--	--	--	X(6)

Table 2. (Continued).

Environmental Resources	Impact-Producing Factors									
	Drilling Rig Presence (incl. sound & lights)	Physical Disturbance to Seafloor	Air Pollutant Emissions	Effluent Discharges	Water Intake	Onshore Waste Disposal	Marine Debris	Support Vessel/ Helicopter Traffic	Accidents	
									Small Fuel Spill	Large Oil Spill
Queen conch	--	--	--	--	--	--	--	--	--	X(6)
<b>Coastal and Marine Birds</b>										
Marine birds	X	--	--	--	--	--	--	X	X(6)	X(6)
Coastal Birds	--	--	--	--	--	--	--	X	--	X(6)
<b>Fisheries Resources</b>										
Pelagic communities and ichthyoplankton	X	--	--	X	X	--	--	--	X(6)	X(6)
Essential Fish Habitat	X	--	--	X	X	--	--	--	X(6)	X(6)
<b>Archaeological Resources</b>										
Shipwreck sites	--	--(7)	--	--	--	--	--	--	--	X(6)
Prehistoric archaeological sites	--	--(7)	--	--	--	--	--	--	--	X(6)
<b>Coastal Habitats and Protected Areas</b>										
Coastal habitats and protected areas	--	--	--	--	--	--	--	X	--	X(6)
<b>Socioeconomic and Other Resources</b>										
Recreational and commercial fishing	X	--	--	--	--	--	--	--	X(6)	X(6)
Public health and safety	--	--	--	--	--	--	--	--	--	X(5,6)
Employment and infrastructure	--	--	--	--	--	--	--	--	--	X(6)
Recreation and tourism	--	--	--	--	--	--	--	--	--	X(6)
Land use	--	--	--	--	--	--	--	--	--	X(6)
Other marine uses	--	--	--	--	--	--	--	--	--	X(6)

(1-8) See table footnotes in the following page.

X = potential impact; dash (--) = no impact or negligible impact.

## Table 2 Footnotes and Applicability to this Program:

Footnotes are numbered to correspond to entries in **Table 2**; project applicability to each case is specified in a bullet point following the respective footnote.

- (1) *Activities that may affect a marine sanctuary or topographic feature. Specifically, if the well, rig site, or any anchors will be on the seafloor within the following:*
  - (a) *3-mile zone of the Flower Garden Banks, or the 4-mile zone of East and West Flower Garden Bank;*
  - (b) *1,000-m, 1-mile, or 3-mile zone of any topographic feature (submarine bank) protected by the Topographic Features Stipulation attached to an Outer Continental Shelf (OCS) lease;*
  - (c) *Essential Fish Habitat (EFH) criteria of 152 m (500 ft) from any no-activity zone; or*
  - (d) *Proximity of any submarine bank (152 m [500-ft] buffer zone) with relief greater than 2 m (7 ft) that is not protected by the Topographic Features Stipulation attached to an OCS lease.*
    - None of these conditions (a through d) are applicable. The project area is not within or near any marine sanctuary, topographic feature, submarine bank, or no-activity zone.
- (2) *Activities with any bottom disturbance within an OCS lease block protected through the Live Bottom (Pinnacle Trend) Stipulation attached to an OCS lease.*
  - The Live Bottom (Pinnacle Trend) Stipulation is not applicable to the project area.
- (3) *Activities within any Eastern Gulf OCS block where seafloor habitats are protected by the Live Bottom (Low-Relief) Stipulation attached to an OCS lease.*
  - The Live Bottom (Low-Relief) Stipulation is not applicable to the project area.
- (4) *Activities on blocks designated by the BOEM as being in water depths 400 m or greater.*
  - No impacts on high-density deepwater benthic communities are anticipated. There are no features indicative of seafloor hard bottom that could support high-density chemosynthetic communities or coral communities within 610 m (2,000 ft) of the proposed wellsite locations (bp, 2023).
- (5) *Exploration or production activities where Hydrogen Sulfide (H<sub>2</sub>S) concentrations greater than 500 ppm might be encountered.*
  - GC 584 is classified as H<sub>2</sub>S Absent. See EP Section 4 for H<sub>2</sub>S management information.
- (6) *All activities that could result in an accidental spill of produced liquid hydrocarbons or diesel fuel that you determine would impact these environmental resources. If the proposed action is located a sufficient distance from a resource that no impact would occur, the EIA can note that in a sentence or two.*
  - Accidental hydrocarbon spills could affect the resources marked (X) in the matrix, and impacts are analyzed in **Section C**.
- (7) *All activities that involve seafloor disturbances, including anchor emplacements, in any OCS block designated by the BOEM as having high-probability for the occurrence of shipwrecks or prehistoric sites, including such blocks that will be affected that are adjacent to the lease block in which your planned activity will occur. If the proposed activities are located a sufficient distance from a shipwreck or prehistoric site that no impact would occur, the EIA can note that in a sentence or two.*
  - No impacts to archaeological resources are expected. A previously submitted archaeological report determined that none of the sonar contacts in the project area were identified as being archaeologically significant.
- (8) *All activities that you determine might have an adverse effect on endangered or threatened marine mammals or sea turtles or their critical habitats.*
  - IPFs that may affect marine mammals, sea turtles, or their critical habitats include drilling rig presence, support vessel and helicopter traffic, and accidents. See **Section C**.
- (9) *Production activities that involve transportation of produced fluids to shore using shuttle tankers or barges.*
  - Not applicable.

The physical presence of the drilling rig in the ocean can attract and potentially impact pelagic marine resources, as discussed in **Section C.5.1**. Offshore vessels maintain exterior lighting for working at night and for navigational and aviation safety in accordance with applicable federal safety regulations. This artificial lighting may also attract and directly or indirectly impact natural resources. Drilling operations produce underwater sounds that may impact certain marine resources. Sources of drilling-related sounds include, for example, riser rotation, DP thrusters, remotely operated vehicle (ROV) operations, and seabed mounted active acoustics (such as ultra-short baseline systems) for positioning. Of the aforementioned sources, only DP thruster activity is expected to produce sound at levels which could result in potential impacts on marine life.

Drilling operations can be expected to produce sound associated with propulsion machinery that transmits directly to the water during station keeping, drilling, and maintenance operations. Additional sound and vibration are transmitted through the hull to the water from auxiliary machinery, such as generators, pumps, and compressors onboard the drilling rig (Richardson et al., 1995). The sound levels produced by DP vessels for station-keeping are largely dependent on the level of thruster activity required to keep position and, therefore, vary based on local ocean currents, vessel thruster specifications, and operational requirements. Representative source levels for vessels in DP mode range from 184 to 190 decibels (dB) referenced to (re) 1 micropascal ( $\mu\text{Pa}$ ) m with a primary frequency below 600 hertz (Hz) (Blackwell and Greene Jr., 2003; McKenna et al., 2012; Kyhn et al., 2014). Zykov (2016) characterized a noisier drillship thruster with a source level, expressed as root-mean-square sound pressure level (SPL), of 190 to 195 dB re 1  $\mu\text{Pa}$  m. The source level for the thrusters used by Zykov (2016) were estimated for power output close to the nominal value (the maximum sustainable) for all thrusters; it is highly unlikely that all the thrusters of all vessels will be operated at such conditions for a prolonged period of time.

Drilling operations produce sound that includes strong tonal components at low frequencies. When drilling, the drill string represents a long vertical sound source (McCauley, 1998). Source levels associated with drilling activities have a maximum broadband (10 Hz to 10 kilohertz [kHz]) energy of approximately 190 dB re 1  $\mu\text{Pa}$  m (Hildebrand, 2005). Based on available data, source levels generated from drillships during drilling and in the absence of thrusters can be expected to range between 154 and 176 dB re 1  $\mu\text{Pa}$  m (Nedwell et al., 2001). The use of thrusters, whether drilling or not, can elevate sound source levels from a drillship or semisubmersible to approximately 188 dB re 1  $\mu\text{Pa}$  m (Nedwell and Howell, 2004).

Positioning of the drilling rig requires the use of a vessel-mounted transducer and a series of transceivers placed on the seafloor. The transducer employs a high frequency acoustic signal (i.e., main energy between 21 and 31 kHz) throughout the operation. While the acoustic signal emitted by the transducer is similar to that emitted by a commercial echosounder, its source level will vary depending upon water depth (i.e., higher source levels required in deeper water). Source levels for the vessel-mounted transceiver, expressed as SPL, are estimated to be >200 dB re 1  $\mu\text{Pa}$  m, with the energy focused towards the seafloor (Equinor, 2019). The directionality and frequency of the source results in minimal propagation outside the main beam of the pulse.

The response of marine mammals, sea turtles, and fishes to a perceived marine sound depends on a range of factors, including 1) SPL, frequency, duration, and novelty of the sound; 2) the physical and behavioral state of the animal at the time of perception; and 3) the ambient acoustic features of the environment (Hildebrand, 2009). Additionally, the sound detection capabilities of a particular species or group of species can make them more or less susceptible to potential impacts from sound sources (BOEM, 2014b).

## **A.2 Physical Disturbance to the Seafloor**

In water depths of 600 m (1,969 ft) or greater, DP drilling rigs disturb only a very small area of the seafloor around the wellbore where the bottom template and blowout preventer (BOP) are located. Depending on the specific well configuration, the total disturbed area is estimated to be 0.25 hectares (ha) (0.62 acres [ac]) per well (BOEM, 2012a).

## **A.3 Air Pollutant Emissions**

The air pollutant emissions are calculated in accordance with BOEM requirements for screening air impacts and summarized in the Air Quality Emissions Report in EP Section 7 and EP Appendix E. The primary air pollutants typically associated with OCS activities are suspended particulate matter (PM<sub>2.5</sub> and PM<sub>10</sub>), sulfur oxides (SO<sub>x</sub>), nitrogen oxides (NO<sub>x</sub>), volatile organic compounds (VOCs), and carbon monoxide (CO) (Reşitoğlu et al., 2015), as well as ammonia (NH<sub>3</sub>) and lead (Pb) per NTL BOEM-2020-G01. These emissions occur mainly from combustion diesel and aviation fuel, also known as Jet-A.

The Air Quality Emissions Report demonstrates that the projected emissions are below exemption levels set by the applicable regulations in 30 CFR § 550.303. Based on this and the distance from shore, it can be concluded that the emissions will not significantly affect the air quality of the onshore area for any of the criteria pollutants.

## **A.4 Effluent Discharges**

Effluent discharges are summarized in EP Section 6.2 and EP Appendix D. All offshore discharges are expected to meet the requirements of the National Pollutant Discharge Elimination System (NPDES) General Permit issued by the U.S. Environmental Protection Agency (USEPA) Region 6 and any applicable U.S. Coast Guard (USCG) regulations such as International Sewage Pollution Prevention Certificates and maintenance logs/records for marine sanitation devices.

Water-based drilling muds and cuttings are expected to be released at the seafloor during the initial well-drilling intervals before the marine riser that enables the return of drilling muds and cuttings to the surface is installed and set. Excess cement slurry will also be released at the seafloor during casing installation for the riserless portion of the drilling operations. Blowout prevention fluids also are expected to be discharged during the setting of the BOP, diverter systems testing after drilling fluids displacement, and at regular testing intervals at NPDES allowable de minimis levels. Drill cuttings generated during synthetic-based drilling mud (SBM) operations will be collected on the rig in dry cuttings boxes. SBM will either be reused by the vendor on the rig or transported via bulk tank containers to Port Fourchon, Louisiana, for recycling and/or disposal at an approved facility. Drill cuttings wetted with some residual SBMs will be discharged at the surface in accordance with the Base Fluids Retained on Cuttings (RoC %) percentage as listed in NPDES permit conditions averaged over all well sections. Dry

cuttings are sent ashore in cutting boxes for disposal at approved facilities. Well treatment fluids, well completion fluids, well workover fluids, residual drilling fluids adhered to marine risers and minor drips/splatters around mud and solids control equipment also are expected to be contained, handled or discharged in accordance with the specified conditions, terms, or limitations in the NPDES permit.

Drilling fluids or cuttings will not be discharged when they fail the static sheen test defined in Appendix 1 of 40 CFR 435, Subpart A.

Other marine vessel effluent discharges are expected from drilling activities and are expected to be discharged in accordance with the conditions in the NPDES permit or USCG regulations (33 CFR 151.51-151.79 and 33 CFR 159) that pertain to the International Convention for the Prevention for Pollution from Ships (MARPOL) 73/78 Annex IV & V. These marine operations effluents include miscellaneous discharges that are untreated, effluents that are treated before discharge, and substances removed during wastewater control. Miscellaneous discharges will consist of uncontaminated seawater/ freshwater, such as uncontaminated ballast/bilge water, fire water, cooling water, potable water, graywater from dishwater, shower, laundry, bath, and washbasin drains, off-specification potable water and desalination unit discharge. Chemically treated effluents include seawater/freshwater to which treatment chemicals such as biocides or corrosion inhibitors have been added, sewage processed through a marine sanitation device, and deck drainage effluents passed through the drillship oil-water separator. Removed substances include, but are not limited to, solids, sewage sludges, filter backwash, and other pollutants removed from wastewater removed in the course of treatment or wastewater control shall be disposed of in a manner such as to prevent any pollutant from such materials from entering navigable waters.

Waste streams that contain free oil will not be discharged as evidenced by the monitoring method specified for that particular stream (e.g., deck drainage) or miscellaneous discharges will not be discharged when they would cause a film or sheen upon or discoloration of the surface of the receiving water.

Under certain circumstances, the drilling rig may relocate to a safe zone which is not located within the leased area to avoid severe weather, loop currents, or to conduct routine maintenance while idled from drilling activities. During these limited times of safe zone harboring, incidental vessel discharges may occur. These discharges are expected to be within the limits represented in the waste and water discharge table estimates submitted as part of this EP.

## **A.5 Water Intake**

Seawater will be drawn from the ocean for once-through, non-contact cooling of machinery on the drilling rig. Section 316(b) of the Clean Water Act requires NPDES permits to ensure that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available to minimize adverse environmental impact from impingement and entrainment of aquatic organisms. The General NPDES Permit specifies design requirements for facilities for which construction commenced after 17 July 2006 with a cooling water intake structure having a design intake capacity of greater than two million gallons of water per day, of which at least 25% is used for cooling purposes. It is expected that the drilling rig ultimately selected for this project will be in compliance with all applicable cooling water intake structure

design requirements, monitoring, and limitations. Where applicable, the drilling rig operator takes responsibility for obtaining necessary NPDES permit coverage for its cooling water intake structure and associated permit compliance.

## **A.6 Onshore Waste Disposal**

A list of the solid and liquid wastes generated during this project to be disposed of onshore are tabulated in EP Section 7.1. Wastes generated during the proposed project are expected to be properly stored and segregated on the drilling rig. Wastes are to be packaged in appropriate non-hazardous or hazardous waste containers for transportation to shore for disposal in an appropriately permitted facility. All other wastes generated by bp and its contractors are managed by their respective waste management procedures. Compliance with established bp waste management practices and procedures is expected to result in either no impacts or negligible impacts.

## **A.7 Marine Debris**

All activities of bp and its contractors relating to solid waste handling, transportation, and disposal will intend to comply with all applicable regulations, including MARPOL 73/78 Annex V requirements, and USEPA, USCG, BSEE, and BOEM regulations. These regulations include prohibitions and compliance requirements regarding the deliberate discharging of containers and other similar materials (i.e., trash and debris) into the marine environment as well as the protective measures to be implemented to prevent the accidental loss of solid material into the marine environment. For example, BSEE regulations 30 CFR § 250.300(a) and (b)(6) prohibit operators from deliberately discharging containers and other similar materials (i.e., trash and debris) into the marine environment, and 30 CFR § 250.300(c) requires durable identification markings on equipment, tools, containers (especially drums), and other material. The USEPA and USCG regulations require operators to be proactive in avoiding accidental loss of solid materials by developing waste management plans, posting informational placards, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Additionally, the debris awareness training, instruction, and placards required by the Protected Species Lease Stipulation should minimize the amount of debris that is accidentally lost overboard by offshore personnel (NMFS [2020a] Appendix B). In compliance with NTL BSEE-2015-G03, bp and its contractors intend to exercise caution in the handling and disposal of small items and packaging materials, require the posting of informational placards at prominent locations on offshore vessels and structures, and mandate a yearly marine trash and debris awareness training and certification process. Compliance with these requirements is expected to result in minimal and only accidental loss of solid waste. Consequently, there will be either no impacts or negligible impacts from this factor.

## **A.8 Support Vessel and Helicopter Traffic**

### **A.8.1 Physical Presence**

IPFs associated with support vessel and helicopter traffic include their physical presence and operational sound. The existing shorebase facilities at Port Fourchon, Louisiana, will be used by bp for support vessel activities. Support helicopters are expected to be based at heliport facilities in Houma, Louisiana. No terminal expansion or construction is planned at either location.

NMFS (2020a) has found that support vessel traffic has the potential to disturb protected species (e.g., marine mammals, sea turtles, fishes) and creates a risk of vessel collisions. The probability of a vessel collision depends on the number, size, and speed of vessels as well as the distribution, abundance, and behavior of the species (Conn and Silber, 2013; Hazel et al., 2007; Jensen and Silber, 2004; Laist et al., 2001; Vanderlaan and Taggart, 2007; NMFS, 2020a). To reduce the potential for vessel collisions, BOEM issued NTL BOEM-2016-G01, which recommends protected species identification training and that vessel operators and crews maintain a vigilant watch for marine mammals and slow down or stop their vessel to avoid striking protected species and requires operators to report sightings of any injured or dead protected species. This NTL was reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) replaces compliance with the NTL. In April 2021 (NMFS, 2021a), the 2020 NMFS Biological Opinion Appendix C Vessel Strike Avoidance and Dead/Injured Protected Species Reporting Protocols (NMFS, 2020a) was amended. The project will be supported by onshore crew boats and supply vessels making trips two days per week, as well as a diesel oil supply vessel making weekly trips as needed. The boats typically move to the project area via the most direct route from the shorebase.

A helicopter will make approximately four round trips per week between the drilling rig and the heliport. The helicopter will be used to transport personnel and small supplies and will normally take the most direct route of travel between the shorebase and the project area when air traffic and weather conditions permit. Offshore support helicopters typically maintain a minimum altitude of 213 m (700 ft) while in transit offshore, 305 m (1,000 ft) over unpopulated areas or across coastlines, and 610 m (2,000 ft) over-populated areas and sensitive habitats such as wildlife refuges and park properties. Additional guidelines and regulations specify that helicopters maintain an altitude of 305 m (1,000 ft) within 100 m (328 ft) of marine mammals (NMFS, 2020a).

**Table 3** summarizes the estimated fuel capacity and trip frequency of the support vessels and aircraft.

Table 3. Support vessel and aircraft fuel capacity and trip frequency or duration in Green Canyon Block 584 during the proposed project.

Vessel/Aircraft Type	Maximum Fuel Tank Storage Capacity	Estimated Trip Frequency or Duration
Helicopter	731 gal	4 flights per week
Crew boats	1,000 bbl	2 per week
Supply Boats	5,000 bbl	2 per week
Diesel oil supply vessel	50,000 gal	Weekly as needed

gal = gallons; bbl = barrel.

## A.8.2 Operational Sound

Offshore support vessels associated with the proposed project will contribute to the overall acoustic environment by transmitting sound through both air and water. The support vessels will use conventional diesel-powered screw propulsion. Vessel sound is a combination of narrow band (tonal) and broadband sound (Richardson et al., 1995; Hildebrand, 2009; McKenna et al., 2012). Tones typically dominate up to approximately 50 Hz, whereas broadband sounds may extend to 100 kHz. The primary sources of vessel sound are propeller cavitation, propeller

singing, and propulsion; other sources include engine noise, flow sound from water dragging along the hull, and bubbles breaking in the vessel's wake (Richardson et al., 1995). The intensity of sound from support vessels is roughly related to ship size, weight, and speed. Broadband source levels for smaller boats (a category that include supply and other service vessels) are in the range of 150 to 180 dB re 1  $\mu$ Pa m (Richardson et al., 1995; Hildebrand, 2009; McKenna et al., 2012).

Penetration of aircraft sound below the sea surface is greatest directly below the aircraft. Aircraft sound produced at angles greater than 13 degrees from vertical is mostly reflected from the sea surface and does not propagate into the water (Richardson et al., 1995). The duration of underwater sound from passing aircraft is much shorter in water than air; for example, a helicopter passing at an altitude of 152 m (500 ft) that is audible in air for 4 minutes may be detectable under water for only 38 seconds at 3 m (10 ft) depth and for 11 seconds at 18 m (59 ft) depth (Richardson et al., 1995).

Dominant tones for helicopters are generally below 500 Hz with source levels ranging from approximately 149 to 151 dB re 1  $\mu$ Pa m (for a Bell 212 helicopter) (Richardson et al., 1995). However, underwater sound levels received from passing aircraft depend on the aircraft's altitude, the aspect (direction and angle) of the aircraft relative to the receiver, receiver depth, water depth, and seafloor type (Richardson et al., 1995). The received level diminishes with increasing receiver depth when an aircraft is directly overhead, but may be stronger at mid-water than at shallow depths when an aircraft is not directly overhead (Richardson et al., 1995). Because of the relatively high expected airspeeds during transits and these physical variables, aircraft-related sound (including both airborne and underwater sound) is expected to be very brief in duration.

## A.9 Accidents

The accidents addressed in the EIA focuses on the following two potential types:

- a small fuel spill, which is the most likely type of spill during OCS exploration activities; and
- a large oil spill, up to and including the WCD for this EP, which is an oil spill resulting from an uncontrolled blowout.

The following subsections summarize assumptions about the sizes and fates of these spills as well as bp's spill response plans. Impacts from these accidents are analyzed in **Section C**.

Recent EISs (BOEM, 2012a,b; 2013; 2014a; 2015; 2016b; 2017) analyzed three types of accidents relevant to drilling operations that could lead to potential impacts to the marine environment: loss of well control, vessel collision, and chemical and drilling fluid spills. These types of accidents, along with dropped objects and an H<sub>2</sub>S release, are discussed briefly below.

Loss of Well Control. A loss of well control is the uncontrolled flow of a reservoir fluid that may result in the release of gas, condensate, oil, drilling fluids, sand, and/or water. Loss of well control includes incidents from the very minor up to the most serious well control incidents, while blowouts are considered to be a subset of more serious incidents with greater risk of oil spill or human injury (BOEM, 2016a; 2017). Loss of well control may result in the release of drilling fluid and/or loss of oil. Not all loss of well control events result in blowouts (BOEM, 2012a). In addition to the potential release of gas, condensate, oil, sand, and/or water, the loss

of well control can also resuspend and disperse bottom sediments (BOEM, 2012a; 2017). BOEM (2016a) noted that most OCS blowouts have resulted in the release of gas.

The robust system bp has in place to prevent loss of well control includes measures to prevent a blowout, reduce the likelihood of a blowout, and conduct effective and early blowout intervention as described in the NTL 2015-N01 package submitted with this EP, as required by BOEM (as discussed in **Section A.9.2**). The potential for a loss of well control event will be minimized by adhering to the requirements of applicable regulations and NTL 2010-N10, which specifies additional safety measures for OCS activities.

Vessel Collisions. BSEE data show that there were 197 OCS-related collisions between 2007 and 2022 (BSEE, 2022). Most collision mishaps are the result of service vessels colliding with platforms or vessel collisions with pipeline risers. Approximately 10% of vessel collisions with platforms in the OCS resulted in diesel spills, and during several collision incidents, fires resulted from hydrocarbon releases. To date, the largest diesel spill associated with a collision occurred in 1979 when an anchor-handling boat collided with a drilling platform in the Main Pass Lease Area, spilling 1,500 barrels (bbl). Diesel fuel is the product most frequently spilled, but oil, natural gas, corrosion inhibitor, hydraulic fluid, and lube oil have also been released as the result of vessel collisions. Human error accounted for approximately half of all reported vessel collisions from 2006 to 2009. As summarized by BOEM (2017), vessel collisions occasionally occur during routine operations. Some of these collisions have caused spills of diesel fuel or chemicals. bp and its contractors intend to comply with all applicable USCG and BOEM safety requirements to minimize the potential for vessel collisions.

Dropped Objects. Objects dropped overboard could potentially pose a risk to existing live subsea pipelines or other infrastructure. If a dropped pipe or other subsea equipment landed on existing seafloor infrastructure, loss of integrity of seafloor pipelines, umbilicals, etc. could result in a spill. Dropped objects could also result in seafloor disturbance and potential impacts to benthic communities. bp and its contractors intend to comply with all BOEM and BSEE safety requirements to minimize the potential for objects dropped overboard.

Chemical Spills. Chemicals are stored and used for pipeline hydrostatic testing, leak and pressure testing of subsea equipment and during drilling and in well completion operations. The relative quantities of their use is reflected in the largest volumes spilled (BOEM, 2017) with completion, workover, and treatment fluids comprising the largest releases. Any potential leak due to pressure testing failure will be limited to a single line leak and would be limited to less than 1 bbl. Potentially spilled fluids include Transaqua HT, monoethylene glycol 50/50, or methanol. Between 2007 and 2014, an average of two chemical spills <50 bbl in volume and three chemical spills >50 bbl in volume occurred each year (BOEM, 2017).

Drilling Fluid Spills. There is the potential for drilling fluids, specifically SBMs, to be spilled due to an accidental riser disconnect (BOEM, 2017). SBMs are relatively nontoxic to the marine environment and have the potential to biodegrade (BOEM, 2014a). The majority of SBM releases are <50 bbl in size, but accidental riser disconnects may result in the release of medium (238 to 2,380 bbl) to large (>2,381 bbl) quantities of drilling fluids. In the event of an SBM spill, there could be short-term localized impacts on water quality and the potential for localized benthic impacts due to SBM deposition on the seafloor. Benthic impacts would be similar to those described in **Section C.2.1**. The potential for riser disconnect and subsequent SBM spills will be minimized by adhering to the requirements of applicable regulations.

H<sub>2</sub>S Release. GC 584 is classified as H<sub>2</sub>S Absent. See EP Section 4 for H<sub>2</sub>S management information.

### **A.9.1 Small Fuel Spill**

Spill Size. According to the analysis by BOEM (2017), the most likely type of small spill (<1,000 bbl) resulting from OCS activities is a failure related to the storage of oil or diesel fuel. Historically, most diesel spills have been ≤1 bbl, and this is predicted to be the most common spill volume in ongoing and future OCS activities in the Western and Central Gulf of Mexico Planning Areas (Anderson et al., 2012). As the spill volume increases, the incident rate declines dramatically (BOEM, 2017). The median size for spills ≤1 bbl is 0.024 bbl, and the median volume for spills of 1 to 10 bbl is 3 bbl (Anderson et al., 2012). For the EIA, a small diesel fuel spill of 3 bbl is used. Operational experience suggests that the most likely cause of such a spill would be a rupture of the fuel transfer hose resulting in a loss of contents (3 bbl of fuel) (BOEM, 2012a).

Spill Fate. The fate of a small fuel spill in the project area would depend on meteorological and oceanographic conditions at the time of the spill as well as the effectiveness of spill response activities. However, given the open ocean location of the project area and response actions, it is expected that impacts from a small spill would be minimal (BOEM, 2016a).

The water-soluble fractions of diesel are dominated by two- and three-ringed polycyclic aromatic hydrocarbons (PAHs), which are moderately volatile (National Research Council, 2003a). The constituents of these oils are light to intermediate in molecular weight and can be readily degraded by aerobic microbial oxidation. Due to its light density, diesel will not sink to the seafloor. Diesel dispersed in the water column can adhere to suspended sediments, but this generally occurs only in coastal areas with high amounts of suspended solids (National Research Council, 2003a) and would not be expected to occur to any appreciable degree in offshore waters of the Gulf of Mexico. Diesel fuel is readily and completely degraded by naturally occurring microbes (National Oceanic and Atmospheric Administration [NOAA], 2006).

Sheens from small fuel spills are expected to persist for relatively short periods of time, ranging from minutes (<1 bbl) to hours (<10 bbl) to a few days (10 to 1,000 bbl), and rapidly spread out, evaporate, and disperse into the water column (BOEM, 2012a).

For purposes of the EIA, the fate of a small diesel fuel spill of 3 bbl was estimated using WebGNOME, a publicly available oil spill trajectory and fate model developed by NOAA (NOAA, 2022). This model uses the physical properties of oils in its database to predict the rate of evaporation and dispersion over time as well as changes in the density, viscosity, and water content of the product spilled. It is estimated that over 90% of a small diesel spill would be evaporated or dispersed within 24 hours (NOAA, 2022). The area of the sea surface with diesel fuel on it during this 24-hour period would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

The WebGNOME results, coupled with spill trajectory information discussed below for a large spill, indicate that a small fuel spill would not impact coastal or shoreline resources. The project area is 116 statute miles (187 km) from the nearest shoreline (Plaquemines Parish, Louisiana). Slicks from small fuel spills are expected to persist for relatively short periods of time ranging from minutes (<1 bbl) to hours (<10 bbl) to a few days (10 to 1,000 bbl) and rapidly spread out, evaporate, and disperse into the water column (BOEM, 2012a). Because of the distance from

shore of these potential spills on the OCS and their lack of persistence, it is unlikely that a spill would make landfall prior to dissipation (BOEM, 2012a).

Spill Response. In the unlikely event the shipboard procedures fail to prevent a fuel spill, response equipment and trained personnel would be activated so that any spill effects would be localized and would result only in short-term environmental consequences. A discussion of bp's response efforts if a spill were to occur during operational activities is provided in EP Appendix G.

Weathering. Following a diesel fuel spill, several physical, chemical, and biological processes, collectively called weathering, interact to change the physical and chemical properties of the diesel, and thereby influence its harmful effects on marine organisms and ecosystems. The most important weathering processes include spreading, evaporation, dissolution, dispersion into the water column, formation of water-in-oil emulsions, photochemical oxidation, microbial degradation, adsorption to suspended particulate matter, and stranding on shore or sedimentation to the seafloor (National Research Council, 2003a; International Tanker Owners Pollution Federation Limited, 2018).

Weathering decreases the concentration of diesel fuel and produces changes in its chemical composition, physical properties, and toxicity. The more toxic, light aromatic and aliphatic hydrocarbons are lost rapidly by evaporation and dissolution from the slick on the water surface. Evaporated hydrocarbons are degraded rapidly by sunlight. Biodegradation of diesel fuel on the water surface and in the water column by marine bacteria removes first the n-alkanes and then the light aromatics. Other petroleum components are biodegraded more slowly (National Research Council, 2003a). Diesel fuel spill response-related activities for facilities included in this EP are governed by bp's ROSRP, which meets the requirements contained in 30 CFR Part 254.

## **A.9.2 Large Oil Spill (Worst Case Discharge)**

Under this EP, bp proposes to drill two production wells in GC 584. The uncontrolled blowout scenario is for a potential blowout of the well which bp calculates has the highest liquid hydrocarbons rate potential in the area.

Spill Size. Day 1 WCD is estimated to be 180,000 barrels of oil per day (BOPD). The maximum duration of the blowout is estimated at 70 days. The rate profile associated with the well blowout over this 70-day scenario results in a potential worst case spill volume estimated at 10.5 million barrels.

Spill Probability. Statistics from offshore drilling in the U.S. Gulf of Mexico provide a reasonable basis for evaluating oil spill risk during exploratory drilling. Historically, blowouts are rare events, and most do not result in oil spills. A 2010 analysis using the SINTEF<sup>1</sup> database estimates a blowout frequency of 0.0017 per exploratory well for non-North Sea locations (International Association of Oil & Gas Producers, 2010). BOEM has updated spill frequencies to include the *Deepwater Horizon* incident and found that spill rates (bbl spilled per bbl produced) for OCS platform spills were unchanged for spills >1,000 bbl when compared with previously published data (Anderson et al., 2012). According to the BSEE analysis conducted for the Final

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<sup>1</sup> Stiftelsen for industriell og teknisk forskning (Foundation for Scientific and Industrial Research, Norwegian Institute of Technology).

Drilling Safety Rule issued in 2010, the baseline risk of a catastrophic blowout is estimated to be once every 26 years (75 *Federal Register* [FR] 63365).

bp is expected to comply with NTL 2010-N10 and the drilling safety regulations in 30 CFR Part 250, Subparts D and G, which specify additional safety measures for OCS activities.

Spill Trajectory. The fate of a large oil spill in the project area would depend on meteorological and oceanographic conditions at the time of and during the spill. The Oil Spill Risk Analysis (OSRA) model is a computer simulation of oil spill transport that uses realistic data for winds and currents to predict spill trajectory. The OSRA report by Ji et al. (2004) provides conditional contact probabilities for shoreline segments in the Gulf of Mexico.

The results for Launch Area 45 (where GC 584 is located) are presented in **Table 4**. The model predicts a <0.5% chance of contact with any shoreline within 10 days of a spill. Shoreline contact is predicted within 30 days for shorelines ranging from Matagorda County, Texas to Plaquemines Parish, Louisiana. The conditional probability of shoreline contact is low (1% to 4%) for all shorelines with predicted contact within 30 days.

Table 4. Conditional probabilities of a spill in the lease area contacting shoreline segments (From: Ji et al., 2004). Values are conditional probabilities that a hypothetical spill in the lease area (represented by Oil Spill Risk Analysis Launch Area 45) could contact shoreline segments within 3, 10, or 30 days.

Shoreline Segment	County or Parish and State	Conditional Probability of Contact <sup>a</sup> (%)		
		3 Days	10 Days	30 Days
C07	Calhoun County, Texas	--	--	1
C08	Matagorda County, Texas	--	--	1
C09	Brazoria County, Texas	--	--	1
C10	Galveston County, Texas	--	--	2
C12	Jefferson County, Texas	--	--	1
C13	Cameron Parish, Louisiana	--	--	4
C14	Vermilion Parish, Louisiana	--	--	2
C15	Iberia Parish, Louisiana	--	--	1
C17	Terrebonne Parish, Louisiana	--	--	2
C18	Lafourche Parish, Louisiana	--	--	1
C20	Plaquemines Parish, Louisiana	--	--	2

<sup>1</sup> Conditional probability refers to the probability of contact within the stated time period, assuming that a spill has occurred (-- indicates <0.5%).

The original OSRA modeling runs reported by Ji et al. (2004) did not evaluate the fate of a spill over time periods exceeding 30 days, nor did they estimate the fate of a release that continues over a period of weeks or months. As noted by Ji et al. (2004), the OSRA model does not consider the chemical composition or biological weathering of oil spills, the spreading and splitting of oil spills, or spill response activities. The model does not specify a particular spill size but has been used by BOEM to evaluate contact probabilities for spills greater than 1,000 bbl.

OSRA is a preliminary risk assessment model. In the event of an actual oil spill, real-time monitoring and trajectory modeling would be conducted using current and wind data available from the rigs and permanent production structures in the area. Satellite and aerial monitoring of

the plume and real-time deterministic trajectory modeling using wind and current data would continue on a daily basis to help position equipment and human resources throughout the duration of any major spill or uncontrolled release.

Weathering. In the event of a diesel fuel spill, it is expected that weathering and evaporation will occur quickly. The constituents of diesel fuel are light to intermediate in molecular weight and can be readily degraded by aerobic microbial oxidation. NOAA has reported that diesel fuel is readily and completely degraded by naturally occurring microbes (NOAA, 2006).

Weathering decreases the concentration of oil and produces changes in its chemical composition, physical properties, and toxicity. The more toxic, light aromatic and aliphatic hydrocarbons are lost rapidly by evaporation and dissolution from a slick on the water surface. For example, the light, paraffinic crude oil spilled during the *Deepwater Horizon* incident lost approximately 55 wt. % to evaporation during the first 3 to 5 days while floating on the sea surface (Daling et al., 2014). Evaporated hydrocarbons are degraded rapidly by sunlight. Biodegradation of oil on the water surface and in the water column by marine bacteria removes first the n-alkanes and then the light aromatics from the oil. Other petroleum components are biodegraded more slowly (National Research Council, 2003a). Photo-oxidation attacks mainly the medium and high molecular weight PAHs in the oil on the water surface (Prince, 2014).

Spill Response. All proposed activities and facilities in this EP will be covered by the Gulf of Mexico ROSRP filed by BP America Inc. (Operator No. 21372) under cover letter dated 10 April 2023 on behalf of several companies listed in the plan including bp Exploration & Production Inc. (Operator No. 02481) and approved by BSEE on 30 May 2023.

The bp ROSRP includes information about enhanced measures for responding to a spill in open water, near shore spill response, and shoreline spill response based on lessons learned from the *Deepwater Horizon* oil spill. In compliance with the requirements of 30 CFR Part 254 and related NTLs, bp's ROSRP includes the following:

- Provisions to maintain access to a supply of dispersant and fire boom for use in the event of an uncontrolled, long-term blowout, for the length of time required to drill a relief well;
- Contingencies for maintaining an ongoing response for the length of time required to drill a relief well;
- A description of the measures and equipment necessary to maximize the effectiveness and efficiency of the response equipment used to recover the discharge on the water's surface. The description will include methods to increase encounter rates, the use of vessel tracking, and the use of remote sensing technologies;
- Information on remote sensing technology and equipment to be used to track oil slicks, including oil spill detection systems and remote thickness detection systems (such as X-band/infrared systems);
- Information pertaining to the use of vessel tracking systems and communication systems between response vessels and spotter personnel;
- A shoreline protection strategy that is consistent with applicable area contingency plans; and
- For operations using a subsea BOP or a surface BOP on a floating facility, a discussion regarding strategies and plans related to source abatement and control for blowouts from drilling.

As a member of the Marine Spill Response Corporation, Clean Gulf Associates, and a client of the National Response Corporation, bp would utilize oil spill response organization personnel and equipment in the event of an oil spill in the Gulf of Mexico. Primary response equipment for the activation of bp's ROSRP is located in Houma, Louisiana; Lake Charles, Louisiana; Galveston, Texas; Pensacola, Florida; Mobile, Alabama; Pascagoula, Mississippi; Ft. Jackson, Louisiana; Venice, Louisiana; and Corpus Christi, Texas. The preplanned staging area for this EP is Port Fourchon, Louisiana.

See EP Appendix G for a detailed description of bp's ROSRP and site-specific response for an oil spill associated with this project.

## B. Affected Environment

The project area is in the central Gulf of Mexico, approximately 116 statute miles (187 km) from the nearest shoreline (Plaquemines Parish, Louisiana), 136 statute miles (219 km) from the onshore support base at Port Fourchon, Louisiana, and 155 statute miles (249 km) from the helicopter base at Houma, Louisiana (**Figure 1**). The water depth at the location of the proposed activities ranges from approximately 1,247 to 1,284 m (4,092 to 4,211 ft) (**Figure 2**).

The seafloor in the vicinity of the proposed activities is expected to be very soft to soft hemipelagic clays and thin clayey turbidites and debris flow deposits. bp (2024) presents additional information on autonomous underwater vehicle interpretation of the seafloor sediments.

A detailed description of the regional affected environment, including meteorology, oceanography, geology, air and water quality, benthic communities, threatened and endangered species, biologically sensitive resources, archaeological resources, socioeconomic conditions, and other marine uses is provided in recent EISs (BOEM, 2012a; 2013; 2014a; 2015; 2016b; 2017, 2023a,b). These regional descriptions, applicable to GC 584, remain valid and are incorporated by reference. General background information is presented in the following sections, and brief descriptions of each potentially affected resource, including site-specific and new information if available, are presented in **Section C**.

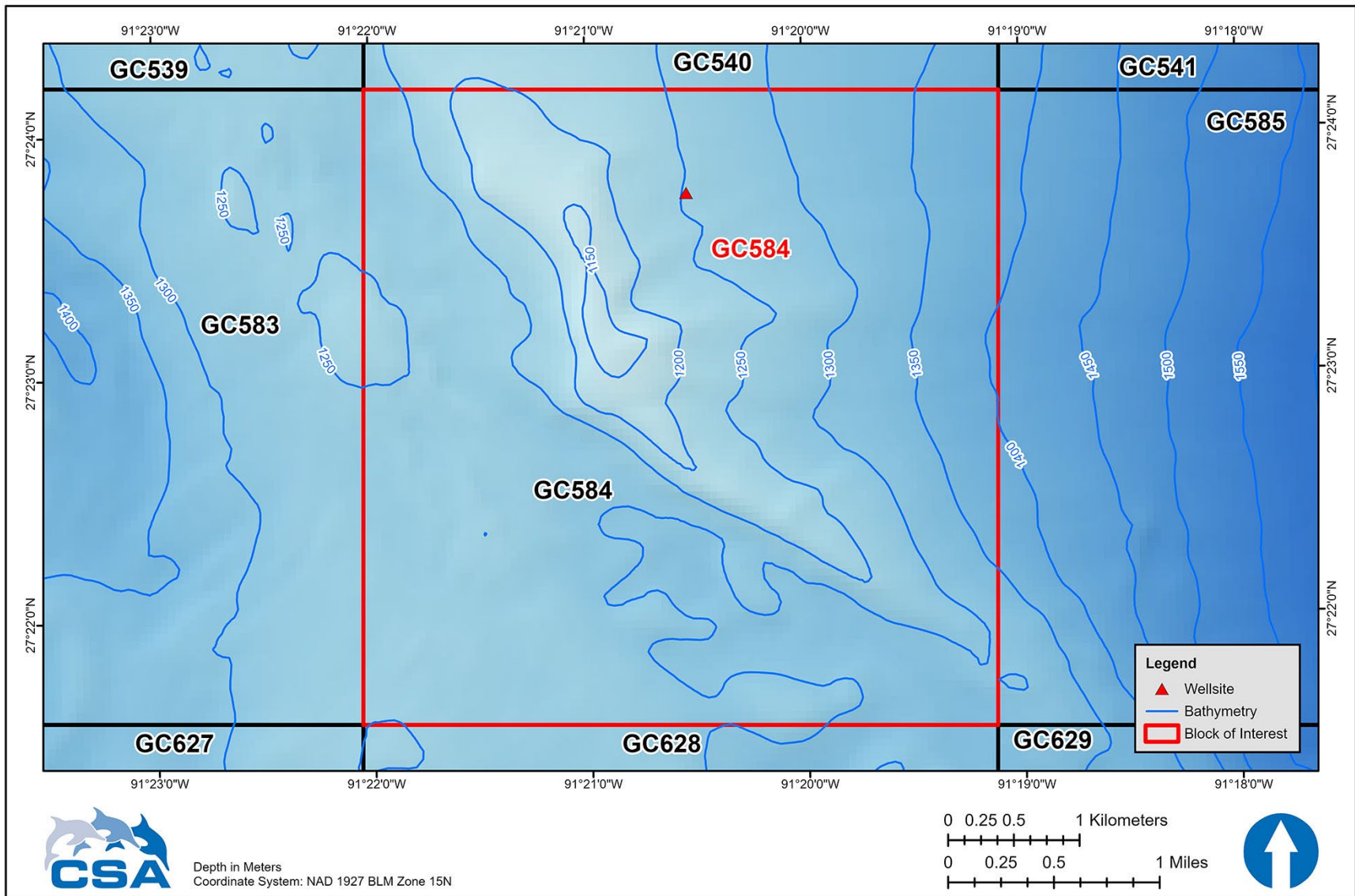


Figure 2. Bathymetric map of the project area showing the proposed wellsite surface hole location in Green Canyon Block 584.

## C. Impact Analysis

This section analyzes the potential direct and indirect impacts of routine activities and accidents. Impacts have been analyzed extensively in lease sale EISs for the Central and Western Gulf of Mexico Planning Areas (BOEM, 2013; 2014a; 2015; 2016a,b; 2017; 2023b) and this information in these documents is incorporated by reference. This section is organized by the environmental resources identified in **Table 2** and addresses each IPF potentially affecting the resource.

### C.1 Physical/Chemical Environment

#### C.1.1 Air Quality

There are no site-specific air quality data for the project area due to the distance from shore. Because of the distance from shore-based pollution sources and the minimally dispersed sources offshore, air quality at the wellsite is expected to be good. The attainment status, (i.e., meeting air quality standards set by the USEPA) of federal OCS waters is unclassified because there is no provision in the Clean Air Act for classification of areas outside state waters (BOEM, 2012a).

In general, ambient air quality of coastal counties along the Gulf of Mexico is relatively good (BOEM, 2012a). As of March 2024, Mississippi, Alabama, and Florida Panhandle coastal counties, in proximity to the project area, are in attainment of the National Ambient Air Quality Standards (NAAQS) for all criteria pollutants (USEPA, 2024). St. Bernard Parish in Louisiana is a nonattainment area for sulfur dioxide based on the 2010 standard. One coastal metropolitan area in Texas (Houston-Galveston-Brazoria) is a nonattainment area for 8-hour ozone (2015 Standard).

Winds in the region are driven by the anticyclonic (clockwise) atmospheric circulation around the Bermuda High, a semi-permanent, subtropical area of high pressure in the North Atlantic Ocean off the East Coast of North America that migrates east and west with varying central pressure (BOEM, 2017). The Gulf of Mexico is located to the southwest of this circulation center, resulting in a prevailing southeasterly to southerly flow, which is conducive to transporting emissions toward shore. However, circulation is also affected by tropical cyclones (hurricanes) during summer and fall and by extratropical cyclones (cold fronts) during winter.

As noted earlier, based on calculations made pursuant to applicable regulations and guidance in NTL BOEM-2020-G01, emissions from drilling activities are not expected to be significant. Therefore, the only potential effects to air quality would be from air pollutant emissions associated with routine operations and accidental spills (a small fuel spill or a large oil spill). These IPFs with potential impacts listed in **Table 2** are discussed below.

#### Impacts of Air Pollutant Emissions

Air pollutant emissions are the only routine IPF likely to affect air quality. Offshore air pollutant emissions will result primarily from the drilling operations and service vessels. These emissions occur mainly from combustion or burning of diesel and Jet-A aircraft fuel. The combustion of fuels occurs primarily in generators, pumps, or motors and from lighter fuel motors. Primary air pollutants typically associated with OCS activities are suspended PM, SO<sub>x</sub>, NO<sub>x</sub>, VOCs, CO, NH<sub>3</sub>, and Pb. As noted by BOEM (2017b), emissions from routine activities are projected to have

minimal impacts to onshore air quality because of the prevailing atmospheric conditions, anticipated emission rates, anticipated heights of emission sources, and the distance to shore of the proposed activities. However, support vessel and helicopter traffic entering or departing coastal facilities will release air pollutants in these areas during the project period. The incremental contribution to cumulative impacts from activities described in bp's EP is minimal and is not expected to cause or contribute to a violation of NAAQS.

Greenhouse gas emissions may contribute to climate change, with important effects on temperature, rainfall, frequency of severe weather, ocean acidification, and sea level rise (Intergovernmental Panel on Climate Change, 2014). Greenhouse gas emissions from this proposed project represent a negligible contribution to the total greenhouse gas emissions from reasonably foreseeable activities in the Gulf of Mexico and are not expected to significantly alter or exceed any of the climate change impacts evaluated in the Programmatic EIS (BOEM, 2016a). Carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>) emissions from the project would constitute a small incremental contribution to greenhouse gas emissions from all OCS activities. According to Programmatic and OCS lease sale EISs (BOEM, 2016a; 2017), estimated CO<sub>2</sub> emissions from OCS oil and gas sources are 0.4% of the U.S. total. Because of the distance from shore, routine operations in the project area are not expected to have any impact on air quality conditions along the coast, including nonattainment areas.

As noted in the lease sale EIS (BOEM, 2017), emissions of air pollutants from routine activities in the Central Gulf of Mexico Planning Area are projected to have minimal impacts to onshore air quality because of the prevailing atmospheric conditions, emission rates, and the distance of these emissions from the coastline. The Air Quality Emissions Report indicates that the projected project emissions are below exemption levels set by the applicable regulations in 30 CFR § 550.303. Based on this and the distance from shore, it can be concluded that the emissions will not significantly affect the air quality of the onshore area for any of the criteria pollutants.

The Breton Wilderness Area, which is part of the Breton National Wildlife Refuge (NWR), is designated under the Clean Air Act as a Prevention of Significant Deterioration Class I air quality area. BOEM is required to notify the National Park Service and U.S. Fish and Wildlife Service (USFWS) if emissions from proposed projects may affect the Breton Class I area. The project area is approximately 191 statute miles<sup>2</sup> (307 km) from the Breton Wilderness Area. bp and its contractors intend to comply with all BOEM requirements regarding air emissions.

There are three Class I air quality areas on the west coast of Florida: St. Marks National Wildlife Refuge in Wakulla County, Chassahowitzka National Wildlife Refuge in Hernando County, and Everglades National Park in Monroe, Miami-Dade, and Collier counties. The project area is approximately 451 statute miles (726 km) from the closest Florida Class I air quality area (St. Marks National Wildlife Refuge Class I Air Quality Area). bp expects to comply with emissions requirements as directed by BOEM.

### **Impacts of a Small Fuel Spill**

Potential impacts of a small spill on air quality are expected to be consistent with those analyzed and discussed by (BOEM, 2012a; 2015; 2016b; 2017, 2023a,b). The probability of a small spill would be minimized by bp's preventative measures during routine operations, including fuel

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<sup>2</sup> Distance calculated based on the nearest point of Green Canyon Block 743.

transfer. In the unlikely event of a spill, implementation of bp's ROSRP is expected to reduce the potential impacts. EP Appendix G includes a detailed discussion of the spill response measures that would be employed.

The EIA small spill scenario is proposed to occur in offshore waters at or near the drilling rig. A small fuel spill would affect air quality near the spill site by introducing VOCs into the atmosphere through evaporation. The WebGNOME model (see **Section A.9.1**) indicates that over 90% of a small diesel spill would be evaporated or dispersed within 24 hours (NOAA, 2022). The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

Because of the offshore location of the proposed small fuel spill, coastal air quality would not be affected because the spill would be expected to be degraded by weathering processes and dissipate prior to making landfall or reaching coastal waters (see **Section A.9.1**).

### **Impacts of a Large Oil Spill**

Potential impacts of a large oil spill on air quality are expected to be consistent with those analyzed and discussed by BOEM (2012a; 2015; 2016b; 2017; 2023a,b). A large oil spill could potentially affect air quality by introducing VOCs into the atmosphere through evaporation. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the spill and the effectiveness of spill response measures. Real-time wind and current data from the project area would be available at the time of a spill and would be used to assess the fate and effects of VOCs released. Additional air quality impacts could occur if response measures included in situ burning of floating oil. Burning would generate a plume of black smoke and result in emissions of NO<sub>x</sub>, SO<sub>x</sub>, CO, and PM as well as greenhouse gases. However, in situ burning would occur only after authorization from the USCG Federal On-Scene Coordinator. This approval would also be based upon consultation with the regional response team, including the USEPA.

Because of the project area's location (116 statute miles [187 km]) from the nearest shoreline, most air quality impacts would occur in offshore waters with minimal chance to affect onshore air quality. However, depending on the spill trajectory and the effectiveness of spill response measures, coastal air quality could be affected if oil on the sea surface approaches or contacts the coast.

#### **C.1.2 Water Quality**

There are no site-specific baseline water quality data for the project area. Deepwater areas in the northern Gulf of Mexico are relatively similar with respect to patterns of water column temperature, salinity, and oxygen (BOEM, 2017). Kennicutt (2000) noted that the deepwater region has little evidence of contaminants in the dissolved or particulate phases of the water column. Within the northern Gulf of Mexico, there are localized areas (termed natural seeps) that release oil, gas, and brines from sub-surface deposits into near surface sediments and up through the water column. No natural seeps were noted within 610 m (2,000 ft) of the proposed wellsites (bp, 2024).

The only IPFs that may affect water quality are effluent discharges associated with routine operations and two types of accidents (a small fuel spill and a large oil spill) as discussed below.

## Impacts of Effluent Discharges

Discharges of treated cuttings with some limited amount of residual SBM may produce temporary, localized increases in suspended solids in the water column around the drilling rig. In general, turbid water can be expected to extend between a few hundred meters and several kilometers down current from the discharge point for water-based drilling muds and cuttings (Neff, 1987). SBMs will be collected on the rig and either reused by the vendor or transported to Port Fourchon, Louisiana, for recycling and disposal at an approved facility. Cuttings wetted with SBMs and SBM discharges associated with weekly safety diverter valve testing on the drillship are expected to be treated to reduce SBM levels at or below NPDES requirements and discharged overboard at the drillsite in accordance with all NPDES permit limitations and requirements. After discharge, SBMs retained on cuttings would be expected to adhere tightly to the cuttings particles and, consequently, would not produce substantial turbidity in the water column (Neff et al., 2000). No persistent impacts on water quality in the project area are expected from drill cutting discharges.

Water-based drilling muds and cuttings will be released at the seafloor during the initial well intervals before the marine riser, which allows returns to the surface, is set. Excess cement slurry also will be released at the seafloor during casing installation for the riserless portion of the drilling operations. The seafloor discharges of WBM and associated drill cuttings will result in seafloor disturbances that will produce locally turbid conditions in the water column near the seafloor. The turbidity plume will be carried away from the well by near-bottom currents and, based on current speed(s), may be detectable within tens to hundreds of meters of the wellbore. As suspended WBM and resuspended sediments settle to the seafloor, the water clarity will return to background conditions within minutes to a few hours after drilling of these well intervals ceases (Neff, 1987). Discharges of WBM and cuttings are likely to have little or no impact on water quality due to the low toxicity and rapid dispersion of these discharges (National Research Council, 1983; Neff, 1987; Hinwood et al., 1994).

Treated sanitary and domestic wastes, including those from support vessels, may have a transient effect on water quality in the immediate vicinity of the discharge at the sea surface. Treated sanitary and domestic wastes may have elevated levels of nutrients, organic matter, and chlorine but should dilute rapidly to undetectable levels within tens to hundreds of meters from the source. All NPDES permit limitations and requirements as well as USCG regulations (as applicable) are expected to be met during proposed activities; therefore, little or no impact on water quality from the overboard releases of treated sanitary and domestic wastes is anticipated.

Deck drainage includes all effluents resulting from rain, deck washings, and runoff from curbs, gutters, and drains (including drip pans) in work areas. Rainwater that falls on uncontaminated areas of the drilling rig will flow overboard without treatment. However, rainwater that falls on the drilling rig deck and other areas such as chemical storage areas and places where equipment is exposed (such as drip or containment pans) will be collected, and oil and water will be separated to meet NPDES permit requirements. Based on expected adherence to permit limits and applicable regulations, little or no impact on water quality from deck drainage is anticipated.

Other discharges in accordance with the NPDES permit, such as desalination unit brine; BOP water-based hydraulic fluids; and uncontaminated cooling water, firewater, ballast water,

bilge water, and other discharges of seawater and freshwater to which treatment chemicals have been added are expected to dilute rapidly and have little or no impact on offshore water quality.

Support vessels will discharge treated sanitary and domestic wastes. These are not expected to have a significant impact on water quality in the vicinity of the discharges. Support vessel discharges are expected to be in accordance with USCG and MARPOL 73/78 regulations and, as applicable, the NPDES Vessel General Permit, and therefore are not expected to cause significant impacts on water quality.

### **Impacts of a Small Fuel Spill**

Potential impacts of a small spill on water quality are expected to be consistent with those analyzed and discussed by BOEM (2012a; 2015; 2016b; 2017, 2023a,b). The EIA small spill scenario is proposed to occur in offshore waters at or near the drilling rig. The probability of a small spill would be minimized by bp's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of bp's ROSRP is expected to potentially help mitigate and reduce the impacts. EP Appendix G provides details on spill response measures in addition to the summary information provided in the EIA.

The water-soluble fractions of diesel are dominated by two- and three-ringed PAHs, which are moderately volatile (National Research Council, 2003a). The molecular weight of diesel fuel (i.e., ultra-low-sulfur marine diesel fuel) constituents is light to intermediate and can be readily degraded by physiochemical weathering processes (e.g., evaporation, dissolution, dispersion, and photochemical oxidation) and biological processes (microbial degradation). Diesel fuel is much lighter than water (specific gravity is between 0.83 and 0.88, compared to 1.03 for seawater). When spilled on water, diesel fuel spreads very quickly to a thin film of rainbow and silver sheens, except for marine diesel, which may form a thicker film of dull or dark colors. However, because diesel fuel has a very low viscosity, it is readily dispersed into the water column when winds reach 5 to 7 knots or with breaking waves (NOAA, 2017a). It is possible for the diesel fuel that is dispersed by wave action to form droplets that are small enough to be kept in suspension and moved by the currents.

Diesel dispersed in the water column can adhere to suspended sediments, but this generally occurs only in coastal areas with high levels of suspended solids (National Research Council, 2003a) and would not be expected to occur to any appreciable degree in offshore waters of the Gulf of Mexico.

Some vessels may contain Heavy Fuel Oil (i.e., No. 6 Fuel Oil, Bunker C) that may sink or be suspended in the water column. This fuel can stick to surfaces and does not readily disperse or breakdown from weathering. However, encounters with these vessels are considered rare and not further discussed.

The extent and persistence of water quality impacts from a small diesel fuel spill would depend on the meteorological and oceanographic conditions at the time of the spill and the effectiveness of spill response measures. It is estimated that more than 90% of a small diesel spill would evaporate or disperse within 24 hours (NOAA, 2022) (see **Section A.9.1**). The sea surface area covered with a very thin layer of diesel fuel would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions. In addition to removal by evaporation, constituents of diesel fuel are readily and completely degraded by naturally occurring microbes

(NOAA, 2006; 2017a). Given the open ocean location of the project area, the extent and duration of water quality impacts from a small spill would not be significant.

### Impacts of a Large Oil Spill

Potential impacts of a large oil spill on water quality are expected to be consistent with those analyzed and discussed by BOEM (2012a; 2015; 2016b; 2017, 2023a,b). Most of the spilled oil would be expected to form a slick at the surface, although information from the *Deepwater Horizon* incident indicates that submerged oil droplets can be produced when subsea dispersants are applied at the wellhead (Camilli et al., 2010; Hazen et al., 2010; NOAA, 2011a,b,c). Dispersants would be applied only after approval from the Federal On-Scene Coordinator with collaboration from the USEPA and Regional Response Team Region 6.

The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the release and the effectiveness of spill response measures. Real-time wind and current data from the project area would be available at the time of a spill and would be used to assess the fate and effects of released hydrocarbons. Weathering processes that affect spilled oil on the sea include adsorption (sedimentation), biodegradation, dispersion, dissolution, emulsification, evaporation, and photo oxidation. Most crude oil blends will emulsify quickly when spilled, creating a stable mousse that presents a more persistent cleanup and removal challenge (NOAA, 2017b).

Hazen et al. (2010) studied the impacts and fate of oil released in the deepwater environment after the 2010 *Deepwater Horizon* incident. Initial studies suggested that the potential exists for rapid intrinsic bioremediation (bacterial degradation) of subsea dispersed oil in the water column by deep-sea indigenous microbial activity without significant oxygen depletion (Hazen et al., 2010), although other studies showed that oil bioremediation caused oxygen drawdown in deep waters (Kessler et al., 2011; Dubinsky et al., 2013). Additional studies investigated the effects of deepwater dissolved hydrocarbon gases (e.g., methane, propane, and ethane) and the microbial response to a deepwater oil spill suggest dissolved hydrocarbon gases may promote rapid hydrocarbon respiration by low-diversity bacterial blooms, thus priming indigenous bacterial populations for rapid hydrocarbon degradation of subsea oil (Kessler et al., 2011; Du and Kessler, 2012; Valentine et al., 2014). A 2017 study identified water temperature, taxonomic composition of initial bacterial community, and dissolved nutrient levels as factors that may regulate oil degradation rates by deep-sea indigenous microbes (Liu et al., 2017).

Due to the project area being located approximately 116 statute miles (187 km) from the nearest shoreline (Plaquemines Parish, Louisiana), it is expected that most water quality impacts would occur in offshore waters before low molecular weight alkanes and volatiles are weathered (Operational Science Advisory Team, 2011), especially in the event of a spill lasting less than 30 days. The 30-day OSRA modeling (**Table 4**) indicates nearshore waters and embayments from Matagorda County, Texas to Plaquemines Parish, Louisiana, could be affected within 30 days of a spill (1% to 4 conditional probability within 30 days).

## C.2 Seafloor Habitats and Biota

The water depth at the location of the proposed wellsite is approximately 1,247 to 1,284 m (4,092 to 4,211 ft). According to BOEM (2016a), existing information for the deepwater Gulf of Mexico indicates that the seafloor is composed primarily of soft sediments; exposed hard substrate habitats and associated biological communities are rare. The site clearance letter did not note the presence of hard bottom communities or potential seepage locations within 610 m (2,000 ft) of the proposed wellsite locations (bp, 2024). The IPFs with potential impacts listed in **Table 2** are discussed below.

### C.2.1 Soft Bottom Benthic Communities

There are no site-specific benthic community data from the project area. However, data from the Northern Gulf of Mexico Continental Slope Habitats and Benthic Ecology Study (Wei, 2006; Rowe and Kennicutt, 2009; Wei et al., 2010; Carvalho et al., 2013; Spies et al., 2016) can be used to describe typical baseline benthic communities in the area. **Table 5** summarizes data collected at one station in water depths similar to those in the proposed project area.

Table 5. Baseline benthic community data from stations near the project area in similar depths sampled during the Northern Gulf of Mexico Continental Slope Habitats and Benthic Ecology Study (Adapted from: Wei, 2006; Rowe and Kennicutt, 2009).

Station	Water Depth (m)	Abundance		
		Meiofauna (>63 $\mu\text{m}$ ; individuals $\text{m}^{-2}$ )	Macroinfauna (>300 mm; individuals $\text{m}^{-2}$ )	Megafauna (>1 cm; individuals $\text{ha}^{-1}$ )
B1	2,255	157,417	1,446	252

Meiofaunal and megafaunal abundances from Rowe and Kennicutt (2009); macroinfaunal abundance from Wei (2006). M = meter, ha = hectare. -- = no data available.

Densities of meiofauna (animals passing through a 0.5-mm sieve but retained on a 0.062-mm sieve) at station in the vicinity of the project area was approximately 157,417 individuals  $\text{m}^{-2}$  (**Table 5**) (Rowe and Kennicutt, 2009). Nematodes, nauplii, and harpacticoid copepods were the three dominant meiofaunal groups, accounting for about 90% of total abundance.

The benthic macroinfauna is characterized by small mean individual sizes and low densities, both of which reflect the meager primary production in surface waters of the Gulf of Mexico continental slope (Wei, 2006). Densities decrease exponentially with water depth. Based on the Wei (2006) equation, the macroinfauna density in the project area in GC 584 are expected to be approximately 1,446 individuals  $\text{m}^{-2}$ .

Polychaetes are typically the most abundant macroinfaunal group on the northern Gulf of Mexico continental slope, followed by amphipods, tanaids, bivalves, and isopods. Carvalho et al. (2013) found polychaete abundance to be higher in the central region of the northern Gulf of Mexico when compared to the eastern and western regions. Wei (2006) recognized four depth-dependent faunal zones (1 through 4), two of which are divided horizontally. The lease area is in Zone 3W, which consists of stations on the mid Texas-Louisiana Slope ranging in depth from 1,875 to 3,008 m (6,152 to 9,869 ft). The most abundant species in this zone were the polychaetes *Levinsonia uncinata*, *Paraonella monilaris*, and *Tachytrypa* sp. A; the bivalve

*Heterodonta* sp. B; and the isopod *Macrostylis* sp. The megafaunal density at one nearby station in the vicinity of the project area was 252 individuals ha<sup>-1</sup>. Common megafauna included motile taxa such as echinoderms, cnidarians (sessile sea anemones, pens and whips), decapod crustaceans, and demersal fish (Rowe and Kennicutt, 2009).

Bacteria also are an important component in terms of biomass and cycling of organic carbon (Cruz-Kaegi, 1998). For example, in deep sea sediments, Main et al. (2015) observed that microbial oxygen consumption rates increased and bacterial biomass decreased with hydrocarbon contamination. Bacterial biomass at the depth range of the project area typically is about 1 to 2 g C m<sup>-2</sup> in the top 15 cm of sediments (Rowe and Kennicutt, 2009).

IPFs that potentially may affect benthic communities are physical disturbance to the seafloor, effluent discharges (drilling muds and cuttings), and potential effects from large oil spill resulting from a well blowout at the seafloor. A small fuel spill would not affect benthic communities because the diesel fuel is expected to float and dissipate on the sea surface.

### **Impacts of Physical Disturbance to the Seafloor**

In water depths such as those in the project area, DP drilling rigs disturb the seafloor only around the wellbore (surface hole location) where the bottom template and BOP are located. Depending upon the specific well configuration, this area of disturbance is generally about 0.25 ha (0.62 ac) per well (BOEM, 2012a).

The areal extent of these impacts from the proposed project are expected to be small compared to the lease area itself, and these types of soft bottom communities are ubiquitous along the northern Gulf of Mexico continental slope (Gallaway, 1988; Gallaway et al., 2003; Rowe and Kennicutt, 2009). Impacts from the physical disturbance of the seafloor during this project are expected to be spatially localized and temporally short term. Therefore, these disturbances will not likely have a significant impact on soft bottom benthic communities in the region.

### **Impacts of Effluent Discharges**

Drilling mud and cuttings are the only effluents that could be present in vicinity of the wellsite that are likely to affect local soft bottom benthic communities. During initial well drilling interval(s) before the marine riser is set, cuttings and water-based mud will be released at the seafloor. Excess cement slurry will also be released at the seafloor during casing installation for the riserless portion of the drilling operations. Cement slurry components typically include cement mix and some of the same chemicals used in water-based drilling muds (Boehm et al., 2001; Fink, 2015). The main impacts will be burial and smothering of benthic organisms within several meters to tens of meters around the wellbore where cuttings and water-based muds physically contact the seafloor. Soft bottom sediments disturbed by cuttings, drilling muds, and cement slurry will eventually be recolonized through larval settlement and migration from adjacent areas. Because some deep-sea biota grow and reproduce slowly, recovery may require several years for the affected area within meters to tens of meters of the wellbore.

Discharges of treated SBM cuttings from the rig may affect benthic communities, primarily within several hundred meters of the wellsite. The fate and effects of SBM cuttings have been reviewed by Neff et al. (2000), and monitoring studies have been conducted in the Gulf of Mexico by Continental Shelf Associates (2004; 2006). In general, treated cuttings with adhering SBMs tend to clump together and form piles close to the drillsite. Areas of SBM cuttings

deposition may develop elevated organic carbon concentrations and anoxic conditions (Continental Shelf Associates, 2006). Where SBM cuttings accumulate in concentrations of approximately 1,000 mg kg<sup>-1</sup> or higher, benthic infaunal communities may be adversely affected due to both the toxicity of the base fluid and organic enrichment (with resulting anoxia) (Neff et al., 2000). Infauna numbers may increase and diversity may decrease as opportunistic species that tolerate low oxygen and high H<sub>2</sub>S levels predominate (Continental Shelf Associates, 2006). As the base synthetic fluid is decomposed by microbes, the area will gradually return to pre-drilling conditions. Disturbed sediments will be recolonized through larval settlement and migration from adjacent areas.

The areal extent of impacts from drilling discharges will be small. Assuming a typical effect radius of 500 m (1,640 ft), the affected area around the wellsite would represent about 3% of the seafloor within a lease block. Impacts from drilling discharges are expected to have no significant impact on these ubiquitous soft bottom benthic communities in the region. It is expected that the rig will move to safe zones for short periods of time to perform maintenance on critical equipment. All discharges during these times are expected to meet NPDES permit requirements.

### **Impacts of a Large Oil Spill**

The most likely effects of a subsea blowout on benthic communities would be within a few hundred meters of the wellsite. BOEM (2012a) estimated that a severe subsurface blowout could resuspend and disperse sediments within a 300 m (984 ft) radius. While coarse sediments (sands) would probably settle at a rapid rate within 400 m (1,312 ft) from the blowout site, fine sediments (silts and clays) could be resuspended for more than 30 days and dispersed over a wider area. Based on previous studies, surface sediments at the project area are assumed to largely be silt and clay (Rowe and Kennicutt, 2009).

While impacts from a large oil spill are anticipated to be confined to the immediate vicinity of the wellhead, depending on the specific circumstances of the incident, additional benthic community impacts could extend beyond the immediate vicinity of the wellhead (BOEM, 2017). During the *Deepwater Horizon* incident, subsurface oil plumes were reported in water depths of approximately 1,100 m (3,600 ft), extending at least 22 miles (35 km) from the wellsite and persisting for more than a month (Camilli et al., 2010).

### **C.2.2 High-Density Deepwater Benthic Communities**

As defined by NTL 2009-G40, high-density deepwater benthic communities are features or areas that could support high-density chemosynthetic communities or high-density hard bottom communities, including deepwater coral-dominated communities. Chemosynthetic communities were discovered in the central Gulf of Mexico in 1984 and have been studied extensively (MacDonald, 2002). Deepwater coral communities are also known from numerous locations in the Gulf of Mexico (Brooke and Schroeder, 2007; CSA International, 2007; Brooks et al., 2012). In the Gulf of Mexico, deepwater coral communities occur almost exclusively on exposed authigenic carbonate rock created by a biogeochemical (microbial) process.

Monitoring programs on the Gulf of Mexico continental slope have shown that benthic impacts from drilling discharges typically are concentrated within approximately 500 m (1,640 ft) of the wellsite, although detectable deposits may extend beyond this distance (Continental Shelf Associates, 2004; Neff et al., 2005; Continental Shelf Associates, 2006). In water depths such as

those encountered in the project area, DP drilling vessels disturb the seafloor only around the wellbore where the bottom template and BOP are located. Depending on the specific well configuration, this area is approximately 0.25 ha (0.62 ac) per well (BOEM, 2012a).

The only IPF identified for this project that could affect high-density deepwater benthic communities is a large oil spill from a well blowout at the seafloor. A small fuel spill would not affect benthic communities because the diesel fuel would float and dissipate on the sea surface. Physical disturbance and effluent discharge are not considered IPFs for deepwater benthic communities because these communities are not expected to be present down current of the proposed wellsite.

### **Impacts of a Large Oil Spill**

A large oil spill caused by a seafloor blowout could cause direct impacts (i.e., caused by the physical impacts of a blowout) on benthic communities within approximately 300 m (984 ft) of the wellhead (BOEM, 2012a; 2013). However, based on the site clearance letter for the proposed wellsites (bp, 2024), there are no seafloor features that could support high-density deepwater benthic communities within 610 m (2,000 ft). Therefore, this type of impact is not expected.

Additional benthic community impacts could extend beyond the immediate vicinity of the wellhead, depending on the specific circumstances (BOEM, 2017). During the *Deepwater Horizon* spill, subsurface plumes were reported at a water depth of approximately 1,100 m (3,600 ft), extending at least 22 miles (35 km) from the wellsite and persisting for more than a month (Camilli et al., 2010). Oil plumes that contact sensitive benthic communities before degrading could potentially impact the resource (BOEM, 2017). Potential impacts on sensitive resources would be an integral part of the decision and approval process for the use of dispersants, and such approval would be obtained from the Federal On-Scene Coordinator upon consultation with the regional response team, including USEPA, prior to the use of dispersants.

The biological effects and fate of the oil remaining in the Gulf of Mexico from the *Deepwater Horizon* incident are still being studied, but numerous papers have been published discussing the nature of subsea oil plumes (e.g., Ramseur, 2011; Reddy et al., 2012; Valentine et al., 2014). Hazen et al. (2010) reported changes in plume hydrocarbon composition with distance from the source. Incubation experiments with environmental isolates demonstrated faster than expected hydrocarbon biodegradation rates at 5°C (41°F). Based on these results, Hazen et al. (2010) suggested the potential exists for intrinsic bioremediation of the oil plume in the deepwater column without substantial oxygen drawdown.

Potential impacts of oil on high-density deepwater benthic communities are discussed in recent EISs (BOEM, 2012a; 2015; 2016b; 2017, 2023a,b). Oil droplets or oiled sediment particles could come into contact with chemosynthetic organisms or deepwater corals in the vicinity of the spill site. Impacts could include loss of habitat, biodiversity, and live coral coverage; destruction of hard substrate; reduction or loss of one or more commercial and recreational fishery habitats; or changes in sediment characteristics (BOEM, 2023a).

### **C.2.3 Designated Topographic Features**

GC 584 is not within or near a designated topographic feature or a no-activity zone as identified in NTL 2009-G39. The nearest designated Topographic Feature Stipulation Block is located approximately 36 statute miles (60 km) from the project area. There are no IPFs associated with routine operations that could cause impacts to designated topographic features.

Due to the distance from the project area, it is unlikely that designated topographic features could be affected by an accidental spill. A small fuel spill would float and dissipate on the surface and would not reach these seafloor features. In the event of an oil spill from a well blowout, a surface slick would not contact these seafloor features. If a subsurface plume were to occur, impacts on these features would be unlikely due to the distance and the difference in water depth from the source. Near-bottom currents in the region are predicted to flow along the isobaths (Nowlin et al., 2001) and typically would not carry a plume upward onto the continental shelf edge.

### **C.2.4 Pinnacle Trend Area Live Bottoms**

The project area is not covered by the Live Bottom (Pinnacle Trend) Stipulation. As defined by NTL 2009-G39, the nearest Pinnacle Stipulation Block is located approximately 213 statute miles (343 km) from the project area. There are no IPFs associated with routine operations that could cause impacts to pinnacle trend area live bottoms due to the distance from the project area.

Due to the distance from the project area, it is unlikely that pinnacle trend live bottom areas would be affected by an accidental spill. A small fuel spill would float on the surface and would not reach these seafloor features. In the event of an oil spill from a well blowout, a surface slick would not contact these seafloor features. If a subsurface plume were to occur, impacts on these features would be unlikely due to the distance and the difference in water depth from the source. Near-bottom currents in the region are predicted to flow along the isobaths (Nowlin et al., 2001) and typically would not carry a plume upward onto the continental shelf edge.

### **C.2.5 Eastern Gulf Live Bottoms**

The project area is not covered by the Live Bottom (Low-Relief) Stipulation, which applies to seagrass communities and low-relief hard bottom reef within the Eastern Gulf of Mexico Planning Area leases in water depths of 100 m (328 ft) or less and portions of Pensacola and Destin Dome Area blocks in the Central Gulf of Mexico Planning Area. The nearest block covered by the Live Bottom Stipulation, as defined by NTL 2009-G39, is located approximately 255 statute miles (410 km) from the project area. There are no IPFs associated with routine operations that could cause impacts to eastern Gulf live bottom areas due to the distance from the project area.

Because of the distance from the project area, it is unlikely that Eastern Gulf live bottom areas would be affected by an accidental spill. A small fuel spill would float and dissipate on the surface and would not reach these seafloor features. In the event of an oil spill from a well blowout, a surface slick would not contact these seafloor features. If a subsurface plume were to occur, impacts on these features would be unlikely due to the distance and the difference in water depth from the source. Near-bottom currents in the region are predicted to flow along the isobaths (Nowlin et al., 2001) and typically would not carry a plume upward onto the continental shelf.

### C.3 Threatened, Endangered, and Protected Species and Critical Habitat

This section discusses species listed as Endangered or Threatened under the Endangered Species Act (ESA). In addition, it includes all marine mammal species in the region, all of which are protected under the Marine Mammal Protection Act (MMPA).

Endangered or Threatened species that may occur in the project area and/or along the northern Gulf Coast are listed in **Table 6**. The table also indicates the location of critical habitat (if designated in the Gulf of Mexico). Critical habitat is defined as (1) specific areas within the geographical area occupied by the species at the time of listing, if they contain physical or biological features essential to conservation, and those features may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species if the agency determines that the area itself is essential for conservation. The NMFS has jurisdiction for ESA-listed marine mammals (cetaceans), sea turtles, and fishes in the Gulf of Mexico. The USFWS has jurisdiction for ESA-listed birds, the West Indian manatee (*Trichechus manatus*), and sea turtles while on their nesting beaches.

Table 6. Federally listed Endangered and Threatened species potentially occurring in the project area and along the northern Gulf Coast. Adapted from: U.S. Fish and Wildlife Service (2020) and National and Oceanic Atmospheric Administration Fisheries (2020).

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in Gulf of Mexico
			Project Area	Coastal	
<b>Marine Mammals</b>					
Rice's whale <sup>1</sup>	<i>Balaenoptera ricei</i>	E	X	--	None
Sperm whale	<i>Physeter macrocephalus</i>	E	X	--	None
West Indian manatee	<i>Trichechus manatus</i> <sup>2</sup>	T	--	X	Florida (Peninsular)
<b>Sea Turtles</b>					
Loggerhead turtle	<i>Caretta caretta</i>	T,E <sup>3</sup>	X	X	Nesting beaches and nearshore reproductive habitat in Mississippi, Alabama, and Florida (Panhandle); <i>Sargassum</i> habitat including most of the central & western Gulf of Mexico.
Green turtle	<i>Chelonia mydas</i>	T	X	X	None
Leatherback turtle	<i>Dermochelys coriacea</i>	E	X	X	None
Hawksbill turtle	<i>Eretmochelys imbricata</i>	E	X	X	None
Kemp's ridley turtle	<i>Lepidochelys kempii</i>	E	X	X	None
<b>Birds</b>					
Piping Plover	<i>Charadrius melodus</i>	T	--	X	Coastal Texas, Louisiana, Mississippi, Alabama, and Florida (Panhandle)
Whooping Crane	<i>Grus americana</i>	E	--	X	Coastal Texas (Aransas National Wildlife Refuge)
Black-capped Petrel	<i>Pterodroma hasitata</i>	E	X	--	None
Rufa Red Knot	<i>Calidris canutus rufa</i>	T	--	X	None
<b>Fishes</b>					
Oceanic whitetip shark	<i>Carcharhinus longimanus</i>	T	X	--	None
Giant manta ray	<i>Mobula birostris</i>	T	X	X	None
Gulf sturgeon	<i>Acipenser oxyrinchus desotoi</i>	T	--	X	Coastal Louisiana, Mississippi, Alabama, and Florida (Panhandle)
Nassau grouper	<i>Epinephelus striatus</i>	T	--	X	None
Smalltooth sawfish	<i>Pristis pectinata</i>	E	--	X	Southwest Florida

Table 6. (continued).

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in Gulf of Mexico
			Project Area	Coastal	
<b>Invertebrates</b>					
Elkhorn coral	<i>Acropora palmata</i>	T	--	X	Florida Keys and the Dry Tortugas
Staghorn coral	<i>Acropora cervicornis</i>	T	--	X	Florida Keys and the Dry Tortugas
Pillar coral	<i>Dendrogyra cylindrus</i>	T	--	X	Southeast Florida and Florida Keys, Puerto Rico, St. Thomas, St. John, St. Croix, and Navassa Island
Rough cactus coral	<i>Mycetophyllia ferox</i>	T	--	X	Southeast Florida and Florida Keys, Puerto Rico, St. Thomas, St. John, St. Croix, and Navassa Island
Lobed star coral	<i>Orbicella annularis</i>	T	--	X	Southeast Florida and Florida Keys, Puerto Rico, St. Thomas, St. John, St. Croix, Navassa Island, East and West Flower Garden Banks, Rankin Bright Bank, Geyer Bank, and McGrail Bank
Mountainous star coral	<i>Orbicella faveolata</i>	T	--	X	Southeast Florida and Florida Keys, Puerto Rico, St. Thomas, St. John, St. Croix, Navassa Island, East and West Flower Garden Banks, Rankin Bright Bank, Geyer Bank, and McGrail Bank
Boulder star coral	<i>Orbicella franksi</i>	T	--	X	Southeast Florida and Florida Keys, Puerto Rico, St. Thomas, St. John, St. Croix, Navassa Island, East and West Flower Garden Banks, Rankin Bright Bank, Geyer Bank, and McGrail Bank
Panama City crayfish	<i>Procambarus econfinae</i>	T	--	X	South-central Bay County, Florida
Queen conch	<i>Aliger gigas</i>	T	--	X	None
<b>Terrestrial Mammals</b>					
Beach mice (Alabama, Choctawhatchee, Perdido Key, St. Andrew)	<i>Peromyscus polionotus</i> subsp. <i>ammobates</i> , <i>allophrys</i> , <i>trissyllepsis</i> , and <i>peninsularis</i> , respectively	E	--	X	Alabama and Florida (Panhandle) beaches
Florida salt marsh vole	<i>Microtus pennsylvanicus dukecampbelli</i>	E	--	X	None

E = Endangered; T = Threatened; X = potentially present; -- = not present.

1 In 2021, the National Marine Fisheries Service recognized that what had previously been accepted as a subspecies of the Bryde's whale is actually a separate species. The reclassification is formerly recognized under 86 FR 47022 effective date 22 October 2021 as the Rice's whale (*Balaenoptera ricei*).

2 There are two subspecies of West Indian manatee: the Florida manatee (*T. m. latirostris*), which ranges from the northern Gulf of Mexico to Virginia, and the Antillean manatee (*T. m. manatus*), which ranges from northern Mexico to eastern Brazil. Only the Florida manatee subspecies is likely to be found in the northern Gulf of Mexico.

3 The Northwest Atlantic Ocean Distinct Population Segment (DPS) of loggerhead turtles is designated as Threatened (76 Federal Register [FR] 58868). The National Marine Fisheries Service and the U.S. Fish and Wildlife Service designated critical habitat for this DPS, including beaches and nearshore reproductive habitat in Mississippi, Alabama, and the Florida Panhandle as well as *Sargassum* spp. habitat throughout most of the central and western Gulf of Mexico (79 FR 39756 and 79 FR 39856).

Coastal Endangered or Threatened species that may occur along the U.S. Gulf Coast include the West Indian manatee, Piping Plover (*Charadrius melodus*), Ruda Red Knot (*Calidris canutus rufa*) Florida salt marsh vole (*Microtus pennsylvanicus dukecampbelli*), Panama City crayfish (*Procambarus econfinae*), Whooping Crane (*Grus americana*), Gulf sturgeon (*Acipenser oxyrinchus desotoi*), smalltooth sawfish (*Pristis pectinata*), Queen conch (*Aliger gigas*) and four subspecies of beach mouse. Critical habitat has been designated for all of these species (except the Florida salt marsh vole, Rufa Red Knot, and Queen conch) as indicated in **Table 6** and discussed in individual sections. Two other coastal bird species (Bald Eagle [*Haliaeetus leucocephalus*] and Brown Pelican [*Pelecanus occidentalis*]) are no longer federally listed as Endangered or Threatened; these are discussed in **Section C.4.2**.

Five sea turtle species, the Rice's whale (*Balaenoptera ricei*), sperm whale (*Physeter macrocephalus*), oceanic whitetip shark (*Carcharhinus longimanus*), and giant manta ray (*Mobula birostris*), and the Black-capped Petrel (*Pterodroma hasitata*) are the only Endangered or Threatened species that could potentially occur within the project area. The listed sea turtles include the leatherback turtle (*Dermochelys coriacea*), Kemp's ridley turtle (*Lepidochelys kempii*), hawksbill turtle (*Eretmochelys imbricata*), loggerhead turtle (*Caretta caretta*), and green turtle (*Chelonia mydas*) (Pritchard, 1997). Effective 11 August 2014, NMFS has designated certain marine areas as critical habitat for the Northwest Atlantic Distinct Population Segment (DPS) of the loggerhead sea turtle (see **Section C.3.5**). No critical habitat has been designated in the Gulf of Mexico for the leatherback turtle, Kemp's ridley turtle, hawksbill turtle, green turtle, or the sperm whale.

Four Endangered mysticetes (blue whale [*Balaenoptera musculus*], fin whale [*Balaenoptera physalus*], North Atlantic right whale [*Eubalaena glacialis*], and sei whale [*Balaenoptera borealis*]) have been reported in the Gulf of Mexico, and are considered rare or extralimital (Würsig et al., 2017). These species are not included in the most recent NMFS stock assessment report (Hayes et al., 2022) nor in the most recent BOEM multisale EIS (BOEM, 2017); therefore, they are not considered further in the EIA.

The Rice's whale exists in the Gulf of Mexico as a small, resident population. This species was formally known as a subspecies to the Bryde's whale (*Balaenoptera edeni brydei*) until a DNA study identified it as a separate species (Rosel et al., 2021). It is the only baleen whale known to be resident to the Gulf of Mexico. The species is severely restricted in range, being found only in the northeastern Gulf in the waters of the DeSoto Canyon (Waring et al., 2016, Rosel et al., 2021). However, recent work by Soldevilla et al. (2022a) suggests the range may be broader than previously thought (see **Section C.3.2**).

In several recent acoustic studies in the Gulf of Mexico (Soldevilla et al., 2022a,b; 2024), all Bryde's whale complex individuals are assumed to be Rice's whales. However, Bryde's whales have a global tropical and sub-tropical range that can include the Gulf of Mexico. Moreover, in the latest NMFS Rice's whale Marine Mammal Stock Assessment Report (Hayes et al., 2023), all previous data of Gulf of Mexico Bryde's whales from studies that pre-dated the Rosel et al. (2021) study that determined that Rice's whales are a distinct species were now assumed to all be Rice's whales. However, it is unclear on what percentage of Bryde's whale complex individuals that live or previously lived in Gulf of Mexico are Rice's whales vs Bryde's whales due to having no DNA studies that analyzed a representative population of Gulf of Mexico Bryde's whale complex individuals.

The giant manta ray could occur in the project area but is most commonly observed in the Gulf of Mexico at the Flower Garden Banks. The Nassau grouper (*Epinephelus striatus*) has been observed in the Gulf of Mexico at the Flower Garden Banks but is most commonly observed in shallow tropical reefs of the Caribbean and is not expected to occur in the project area. The smalltooth sawfish is a coastal species limited to shallow areas off the west coast of Florida and is not expected to occur in the project area. The Panama City crayfish (*Procambarus econfinae*) is a coastal species in south-central Bay County, Florida and is not expected to occur in the project area.

Seven Threatened coral species are known from the northern Gulf of Mexico: elkhorn coral (*Acropora palmata*), staghorn coral (*Acropora cervicornis*), lobed star coral (*Orbicella annularis*), mountainous star coral (*Orbicella faveolata*), boulder star coral (*Orbicella franksi*), pillar coral (*Dendrogyra cylindrus*), and rough cactus coral (*Mycetophyllia ferox*). These corals are shallow water, zooxanthellate species (containing symbiotic photosynthetic zooxanthellae which contribute to their nutritional needs) and so are not present in the deepwater project area (see **Section C.3.18**).

There are no other Threatened or Endangered species in the Gulf of Mexico that are likely to be adversely affected by either routine or accidental events. The IPFs with potential impacts listed in **Table 2** are discussed below.

### **C.3.1 Sperm Whale (Endangered)**

The Endangered marine mammal likely to be present at or near the project area is the sperm whale. Resident populations of sperm whales occur within the Gulf of Mexico; a species description is presented in the recovery plan for this species (NMFS, 2010b). Gulf of Mexico sperm whales are classified as an Endangered species and a “strategic stock” (defined as a stock that may have unsustainable human-caused impacts) by NOAA Fisheries (Waring et al., 2016). A “strategic stock” is defined by the MMPA as a marine mammal stock that meets the following criteria:

- The level of direct human-caused mortality exceeds the potential biological removal level;
- Based on the best available scientific information, is in decline and is likely to be listed as a Threatened species under the ESA within the foreseeable future; or
- Is listed as a Threatened or Endangered species under the ESA or is designated as depleted under the MMPA.

Current threats to sperm whale populations are defined as “any factor that could represent an impediment to recovery.” Current threats to sperm whale populations worldwide include fisheries interactions, anthropogenic marine sound, vessel interactions, contaminants and pollutants, disease, injury from marine debris, research, predation and natural mortality, direct harvest, competition for resources, loss of prey base due to climate change and ecosystem change, and cable laying. In the Gulf of Mexico, the impacts from many of these threats are identified as either low or unknown (BOEM, 2012a).

The distribution of sperm whales in the Gulf of Mexico is correlated with mesoscale physical features such as eddies associated with the Loop Current (Jochens et al., 2008). Sperm whale populations in the north-central Gulf of Mexico are present throughout the year (Davis et al., 2000). Results of a multi-year tracking study show female sperm whales are typically concentrated along the upper continental slope between the 200- and 1,000-meter (656 and

3,280 ft) depth contours (Jochens et al., 2008). Male sperm whales were more variable in their movements and were documented in water depths greater than 3,000 m (9,843 ft). Generally, groups of sperm whales observed in the Gulf of Mexico during the MMS-funded Sperm Whale Seismic Study (SWSS) consisted of mixed-sex groups comprising adult females with juveniles, and groups of bachelor males. Typical group size for mixed groups was 10 individuals (Jochens et al., 2008).

A review of PSO sighting reports from seismic mitigation surveys in the Gulf of Mexico conducted over a 6-year period found a mean group size for sperm whales of 2.5 individuals (Barkaszi et al., 2012). In these mitigation surveys, sperm whales were the most common large cetacean encountered. Tagging and observation data from the SWSS also showed that sperm whales' transit through the vicinity of the project area. Movements of satellite-tracked individuals suggest that this area of the continental slope is within the home range of the Gulf of Mexico population (within the 95% utilization distribution) (Jochens et al., 2008).

IPFs that may potentially affect sperm whales include drilling rig presence, underwater sound, and lights; support vessel and helicopter marine sound; support vessel collisions; and two types of accidents (a small fuel spill and a large oil spill). Effluent discharges are likely to have negligible impacts on sperm whales due to rapid dilution, the small area of ocean affected, the intermittent nature of the discharges, and the mobility of these marine mammals. Compliance with NTL BSEE-2015-G03 is intended to minimize the potential for marine debris-related impacts on sperm whales.

Though NMFS (2020a) stated marine debris as an IPF, compliance with BSEE NTL 2015-G03 and NMFS (2020a) Appendix B will minimize the potential for marine debris-related impacts on sperm whales. NMFS (2020a) estimates that no more than three sperm whales will be non-lethally taken, with one sperm whale lethally taken through the ingestion of marine debris over 50 years of proposed action. Therefore, marine debris is likely to have negligible impacts on sperm whales and is not discussed further (See **Table 2**).

### **Impacts of Drilling Rig Presence, Marine Sound, and Lights**

Sound from routine drilling activities (see **Section A.1**) has the potential to disturb individuals or groups of sperm whales or mask the sounds they would normally produce or hear. Behavioral responses to sound by marine mammals vary widely and overall, are short-term and include, temporary displacement or cessation of feeding, resting, or social interactions (NMFS, 2009a; Gomez et al., 2016). Additionally, behavioral changes resulting from auditory masking sounds may induce an animal to produce more calls, longer calls, or shift the frequency of the calls. For example, masking caused by vessel sound was found to result in a reduced number of whale calls in the Gulf of Mexico (Azzara et al., 2013).

NMFS (2018a) lists sperm whales in the same functional hearing group (i.e., mid frequency cetaceans) as most dolphins and other toothed whales (i.e., odontocetes), with an estimated hearing sensitivity from 150 Hz to 160 kHz. Therefore, DP vessel-related sound is likely to be audible to sperm whales. Frequencies <150 Hz produced by the drilling operations may be audible but are not likely to be perceived with any significance by mid-frequency cetaceans. The sperm whale may possess better low frequency hearing than some of the other odontocetes, although not as low as many baleen whale species whose vocalizations between 12 Hz and 28 kHz (Wartzok and Ketten, 1999). Generally, most of the vocalizations produced by sperm

whales occur at frequencies below 10 kHz, although diffuse energy up to and past 20 kHz is common, with source levels up to 236 dB re1  $\mu$ Pa m (Møhl et al., 2003).

It is expected that, due to the relatively stationary nature of the proposed activities, sperm whales would move away from the proposed operations area, and sound levels that could cause auditory injury would be avoided. Sound associated with proposed vessel operations may cause behavioral disturbances to sperm whales. Observations of behavioral responses of marine mammals to anthropogenic sound, in general, have been limited to short term behavioral responses, which included the temporary cessation of feeding, resting, or social interactions (NMFS, 2016). Animals can determine the direction from which a sound arrives based on cues, such as differences in arrival times, sound levels, and phases at the two ears. Thus, an animal's directional hearing capabilities have a bearing on its ability to avoid sound sources.

NMFS (2018a) presents criteria that are used to determine physiological (i.e., injury) thresholds for marine mammals. Behavioral disturbance thresholds have not been updated in the most recent acoustic guidance (NMFS, 2018a) and therefore, revert to thresholds established and published by NMFS in FR 70(7): 1871-1875 (NMFS and NOAA, 2005). Behavioral disturbance thresholds for marine mammals are applied equally across all functional hearing groups. Received SPL of 120 dB re 1  $\mu$ Pa from a non-impulsive source is considered high enough to elicit the onset of a behavioral reaction in some marine mammal species. The 120-dB isopleth may extend tens to hundreds of kilometers from the source depending on the propagation environment. However, in the case of behavioral responses, exposure to above-threshold sound levels alone do not indicate a behavioral response and, more importantly, do not equate to biologically important responses (Southall et al., 2016; Ellison et al., 2012).

For mid-frequency cetaceans exposed to non-impulsive sources, acoustic injury such as permanent threshold shifts are estimated to occur when the mammal has received a sound exposure level over 24 hours ( $SEL_{24h}$ ) of 198 dB re 1  $\mu$ Pa<sup>2</sup> s. Similarly, temporary threshold shifts are estimated to occur when the mammal has received an  $SEL_{24h}$  of 178 dB re 1  $\mu$ Pa<sup>2</sup> s. Due to transient nature of sperm whales and the stationary nature of drilling activities, it is not expected that any sperm whales will remain in proximity to the source for a full 24-hour period to receive an  $SEL_{24h}$  necessary for the onset of auditory threshold shifts.

There are other OCS facilities and activities near the project area, and the region as a whole has a large number of similar marine sound sources. Drilling-related marine sound associated with this project may contribute to increases in the marine sound environment within the region, but it is not expected to be at amplitudes sufficient to result in auditory injuries to sperm whales. The proposed activity may cause behavioral effects, primarily avoidance or temporary displacement from the project area, but are not expected to be biologically significant for the population. Drilling rig lighting and presence are not expected to impact sperm whales (NMFS, 2007; BOEM, 2016a; 2017) and therefore, are not identified as IPFs.

## Impacts of Support Vessel and Helicopter Traffic

Support vessel traffic has the potential to disturb sperm whales, and there is also a risk of vessel collisions, which are identified as a threat in the recovery plan for this species (NMFS, 2010b). To reduce the potential for vessel collisions, BOEM issued BOEM-2016-G01. This NTL recommends that vessel operators and crews receive protected species identification training. This NTL was reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) replaces compliance with the NTL as well as the amendment in April 2021 (NMFS, 2021a). Vessel operators are required to maintain a vigilant watch for and report sightings of any injured or dead protected species. In addition, when sperm whales are sighted, vessel operators and crews are required to maintain a distance of 100 m (328 ft) or greater whenever possible (NTL BOEM 2016-G01 and NMFS, 2020a, 2021a).

Vessel operators are required to reduce vessel speed to 10 knots or less, as safety permits, when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel (NTL BOEM-2016-G01). When sperm whales are sighted while a vessel is underway, the vessel should take action (e.g., attempt to remain parallel to the whale's course, avoid excessive speed or abrupt changes in direction until the whale has left the area) as necessary to avoid violating the relevant separation distance. However, if the sperm whale is sighted within this distance, the vessel should reduce speed and shift the engine to neutral and not re-engage until the whale is outside of the separation area. This does not apply to any vessel towing gear (NMFS [2020a] Appendix C). Compliance with these mitigation measures will minimize the likelihood of vessel collisions as well as reduce the chance for disturbing sperm whales. However, this mitigation is effective only during daylight hours and during periods of adequate visibility.

NMFS (2020a) analyzed the potential for vessel collisions and harassment of sperm whales in its Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico. NMFS concluded that the observed avoidance of passing vessels by sperm whales is an advantageous response to avoid a potential threat and is not expected to result in any significant effect on migration, breathing, nursing, breeding, feeding, or sheltering to individuals, or have any consequences at the level of the population. With the implementation of the NMFS vessel collision protocols listed in Appendix C of NMFS (2021a) in addition to the NTL BOEM-2016-G01, NMFS concluded that the likelihood of collisions between vessels and sperm whales would be reduced during daylight hours. During nighttime and during periods of poor visibility, it is assumed that vessel sound and sperm whale avoidance of moving vessels would reduce the chance of vessel collisions with this species. It is, however, likely that a collision between a sperm whale and a moving support vessel would result in severe injury or mortality of the stricken animal. The current Potential Biological Removal (PBR) level for the Gulf of Mexico stock of sperm whales is 2.0 (Hayes et al., 2022). The PBR level is defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population. Mortality of a single sperm whale would constitute a significant impact to the local (Gulf of Mexico) stock of sperm whales but would not likely be significant at the species level.

Helicopter traffic also has the potential to disturb sperm whales. Smultea et al. (2008) documented responses of sperm whales offshore Hawaii to fixed wing aircraft flying at an altitude of 245 m (800 ft). A reaction to the initial pass of the aircraft was observed during 3 (12%) of 24 sightings. All three responses consisted of a hasty dive and occurred at less than 360 m (1,180 ft) lateral distance from the aircraft. Additional reactions were seen when aircraft circled certain whales to make further observations. Based on other studies of cetacean responses to sound, the authors concluded that the observed reactions to brief overflights by the aircraft were short-term and limited to behavioral disturbances.

While flying offshore in the Gulf of Mexico, support helicopters maintain altitudes above 213 m (700 ft) during transit to and from the working area. In the event that a whale is observed during transit, the helicopter will not approach or circle the animals. Although whales may respond to helicopters (Smultea et al., 2008), NMFS (2020a) concluded that this altitude would minimize the potential for disturbing sperm whales. Therefore, no significant impacts are expected.

### **Impacts of a Small Fuel Spill**

Potential spill impacts on marine mammals, including sperm whales, are discussed by NMFS (2020a) and BOEM (2017). Oil impacts on marine mammals are discussed by Geraci and St. Aubin (1990) and by the Marine Mammal Commission (MMC) (2011) with discussions germane to the Gulf of Mexico populations concerning composition and fate of petroleum and spill-treating agents in the marine environment, aspects of cetacean ecology, and physiological and toxic effects of oil on cetaceans. For this EP, there are no unique site-specific issues with respect to spill impacts on these animals that were not analyzed in the previous documents.

A small fuel spill in offshore waters would produce a thin sheen on the water surface and introduce concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the spill and the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that over 90% would be evaporated or dispersed naturally within 24 hours (NOAA, 2022). The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

Direct physical and physiological effects of exposure to diesel fuel could include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil directly or via contaminated prey; and stress from the activities and marine sound of response vessels and aircraft (MMC, 2011). However, due to the limited areal extent and short duration of water quality impacts from a small fuel spill as well as the mobility of sperm whales, no significant impacts would be expected.

The probability of a fuel spill will be minimized by bp's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of bp's ROSRP will mitigate and lessen the potential for impacts on sperm whales. Given the open ocean location of the project area, the duration of a small spill is expected to be brief and therefore potential for impacts to be minimal.

## Impacts of a Large Oil Spill

Potential spill impacts on marine mammals, including sperm whales, are discussed by NMFS (2020a) and BOEM (2017, 2023a,b). Oil impacts on marine mammals are discussed by Geraci and St. Aubin (1990) and by the MMC (2011). For this EP, there are no unique site-specific issues with respect to spill impacts on sperm whales.

Impacts of oil spills on sperm whales can include direct impacts from oil exposure as well as indirect impacts due to response activities and materials (e.g., vessel traffic, marine sound, and dispersants) (MMC, 2011). Direct physical and physiological effects can include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil (and dispersants) directly or via contaminated prey; and stress from the activities and marine sound of response vessels and aircraft. The level of impact of oil exposure depends on the amount, frequency, and duration of exposure; route of exposure; and type or condition of petroleum compounds or chemical dispersants (Hayes et al., 2020). Complications of the above may lead to dysfunction of immune and reproductive systems, physiological stress, declining physical condition, and death. Behavioral responses can include displacement of animals, including displacement from prime habitat, disruption of social structure, changing prey availability and foraging distribution and/or patterns, changing reproductive behavior/productivity, and changing movement patterns or migration (MMC, 2011).

In the event of a large spill, the level of vessel and aircraft activity associated with spill response could disturb sperm whales and potentially result in vessel collisions, entanglement, or other injury or stress. Response vessels are expected to operate in accordance with NTL BOEM-2016-G01 to reduce the potential for colliding with or disturbing these animals. This NTL was reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) and the amendment in April 2021 (NMFS, 2021a) replaces compliance with the NTL. Based on the current PBR level for the Gulf of Mexico stock of sperm whales (2.0), mortality of a single sperm whale would constitute a significant impact to the local (Gulf of Mexico) stock of sperm whales but would not likely be significant at the species level.

### C.3.2 Rice's Whale (Endangered)

A study by Rosel et al. (2021), identified the genetically distinct northern Gulf of Mexico Bryde's whale stock as a new species of baleen whale named the Rice's whale through DNA analysis. The reclassification was approved by NMFS under 86 FR 47022 and was effective 22 October 2021. The Rice's whale is the only year-round resident baleen whale in the northern Gulf of Mexico. The Rice's whale is sighted most frequently in the waters over DeSoto Canyon between the 100 m (328 ft) and 1,000 m (3,280 ft) isobaths (**Figure 3** ; Rosel et al., 2016; Hayes et al., 2021). **Figure 3** also shows the Rice's whale Biologically Important Area defined in 2015 after ESA Section 7 consultations between NMFS and other agencies, as well as the Rice's Whale Core Distribution Area defined in 2019 by NMFS.

Most sightings have been made in the DeSoto Canyon region and off western Florida, although there have been some in the west-central portion of the northeastern Gulf of Mexico. Soldevilla et al. (2022) identified new variants of long-moan calls along the northwestern Gulf of Mexico shelf break that were determined to share distinctive features with typical eastern Gulf of Mexico long-moan calls. A genetically confirmed sighting of a Rice's whale individual offshore Corpus Christi, Texas in 2017, along with the newly identified long-moan calls in the

northwestern Gulf of Mexico indicate that Rice's whales may occur in a broader range in the Gulf of Mexico than previously known and this broader range should be considered when designating critical habitat. The sighting of this individual in 2017 partially resulted in the issuance of BOEM NTL-2023-G01, which established an Expanded Rice's Whale Area that encompasses all areas in the northern Gulf of Mexico between the 100 and 400 m isobaths (**Figure 3**). It is not currently possible to differentiate between Rice's whales and Bryde's whales without performing DNA sampling or by examining the skull from a deceased specimen. For the purposes of mitigation, any Bryde's whale complex individual detected would be treated as a possible Rice's whale.

Kiszka et al. (2023) studied the drivers of resource selection by Rice's whale in relation to prey availability and energy density. The study indicated that Rice's whales are selective predators consuming schooling prey with the highest energy content (i.e., silver rag [*Ariomma bondi*]). The silver rag is found at a depth range of 25 to 640 m (82 to 2,100 ft) primarily over muddy bottoms on the OCS though juveniles can be within the surficial waters (Smithsonian Tropical Research Institute, 2015). Therefore, it is unlikely that Rice's whales would occur in the project area. However, support vessels transiting through the 25 to 640 m (82 to 2,100 ft) water depths could encounter a Rice's whale, although unlikely given the rate of sightings of the whales.

In 2014, a petition was submitted to designate the northern Gulf of Mexico population as a DPS and list it as Endangered under the ESA (Natural Resources Defense Council, 2014). This petition received a 90-day positive finding by NMFS in 2015 and a proposed rule to list was published in 2016 (Hayes et al., 2019). On 15 April 2019, NMFS issued a final rule to list the Gulf of Mexico DPS of Bryde's whale as Endangered under the ESA. NMFS final rule on the reclassification (86 FR 47022) does not affect the ESA standing; thus, the Rice's whale is listed as an Endangered species.

Although it is unlikely that the Rice's whales would occur in the project area, IPFs that could affect the Rice's whales, if present, include drilling rig presence, marine sound, and lights; support vessel and helicopter traffic; and both types of spill accidents: a small fuel spill and a large oil spill. Effluent discharges are likely to have negligible impacts on Rice's whales due to rapid dispersion, the small area of ocean affected, the intermittent nature of the discharges, and the mobility and low abundance of Rice's whales in the Gulf of Mexico.

Though NMFS (2020a) stated marine debris as an IPF, compliance with BSEE NTL 2015-G03 and NMFS (2020a) Appendix B will minimize the potential for marine debris-related impacts on Rice's whales. NMFS (2020a) estimated one sublethal take and no lethal takes of Rice's whale (Bryde's whales at the time of publication) from marine debris over 50 years of proposed action. Therefore, marine debris is likely to have negligible impacts on Rice's whales and is not further discussed (See **Table 2**).

NTL BOEM 2023-G01 provides recommendations and guidance for operators regarding suggested measures to expand protections for the Rice's whale while BOEM and BSEE are involved in consultation with NMFS on the amended 2020 Biological Opinion. The NTL guidance applies to the Expanded Rice's Whale Area (**Figure 3**), comprising the entire northern Gulf of Mexico between the 100 and 400 m isobaths.

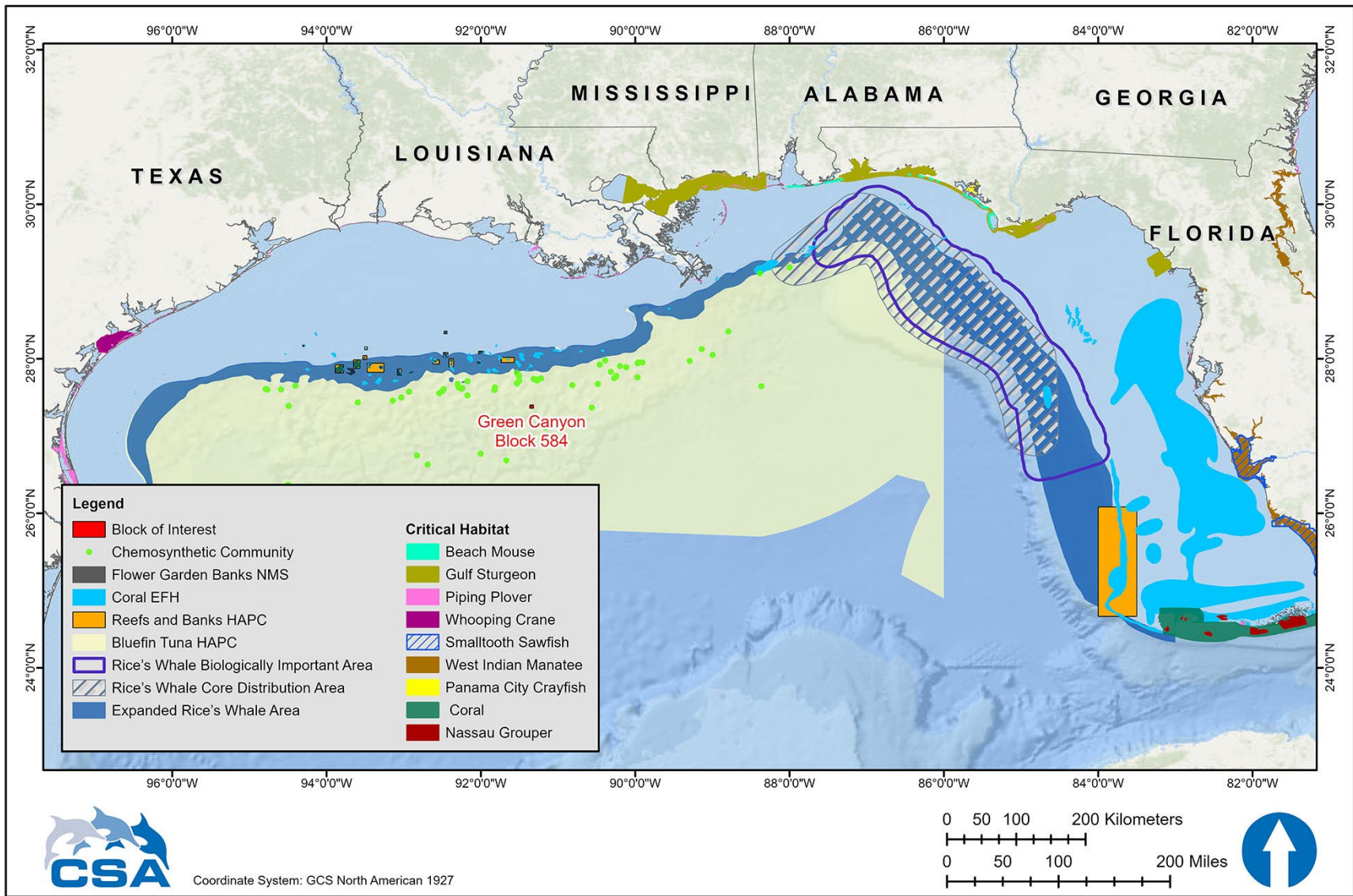


Figure 3. Location of selected environmental features in relation to the project area. EFH = Essential Fish Habitat; HAPC = Habitat Area of Particular Concern; NMS = National Marine Sanctuary.

## Impacts of Drilling Rig Presence, Marine Sound, and Lights

NMFS (2018a) lists Rice's whales in the functional hearing group of low frequency cetaceans (baleen whales), with an estimated hearing sensitivity from 7 Hz to 35 kHz. Noise produced by the drilling rig and drilling-associated vessels may be emitted at levels that could potentially disturb individual whales or mask the sounds animals would normally produce or hear. Sound associated with drilling activities is relatively low in intensity relative to impulsive sources such as airgun sound, and an individual animal's sound exposure would be transient. As discussed in **Section A.1**, an actively drilling rig may produce broadband (10 Hz to 10 kHz) source levels ranging from approximately 180 to 190 dB re 1  $\mu\text{Pa}$  m (Hildebrand, 2005). Frequencies <1,000 Hz produced by the drilling operations are more likely to be perceived by low-frequency cetaceans, such as the Rice's whale.

It is expected that, due to the relatively stationary nature of the drilling operations, Rice's whales would move away from the proposed operations area, and sound levels that could cause auditory injury would be avoided. Sound associated with proposed vessel operations may cause behavioral disturbance effects to individual Rice's whales. NMFS (2018a) presents criteria that are used to determine physiological (i.e., acoustic injury) thresholds for marine mammals. Behavioral disturbance thresholds have not been updated in the most recent acoustic guidance (NMFS, 2018a) and therefore, revert to thresholds established and published by NMFS in 70 FR 1871. Received SPL of 120 dB re 1  $\mu\text{Pa}$  from non-impulsive sources are considered high enough to elicit the onset of a behavioral reaction in some marine mammal species. The 120-dB isopleth may extend tens to hundreds of kilometers from the source depending on the propagation environment. However, exposure to SPL of 120 dB re 1  $\mu\text{Pa}$  does not alone equate to a behavioral response or a biological consequence; rather it represents the level at which onset of a behavioral response may occur that, more importantly, may not result in biologically significant responses (Southall et al., 2016; Ellison et al., 2012).

For low-frequency cetaceans, specifically the Rice's whale, permanent and temporary threshold shift onset is estimated to occur at  $\text{SEL}_{24\text{h}}$  of 199 dB re 1  $\mu\text{Pa}^2 \text{ s}$  and 179 re 1  $\mu\text{Pa}^2 \text{ s}$ , respectively. Sounds generated by drilling operations, located within a deep-water, open ocean environment, will be generally non-impulsive, with some variability in sound level and frequency, and are not expected to reach permanent or temporary threshold shift values. This analysis assumes that the continuous nature of sounds produced by the drilling rig will provide individual whales with cues relative to the direction and relative distance of the sound source, and the fixed position of the drilling rig will allow for active avoidance of potential physical impacts. Drilling-related sound associated with this project may contribute to increases in the ambient sound environment of the region but are not expected to cause sound-related impacts to Rice's whales. Drilling rig lighting and presence are not expected to impact Rice's whales (BOEM, 2017).

## Impacts of Support Vessel and Helicopter Traffic

Support vessel traffic has the potential to disturb Rice's whales and create the potential for vessel collisions. Kiszka et al. (2023) indicated through Bayesian stable isotope mixing models that Rice's whales primarily feed on silver rag found between 25 and 640 m water depths. Although it is unlikely support vessels will encounter Rice's whale given that they are primarily found over DeSoto Canyon between the 100 m (328 ft) and 1,000 m (3,280 ft) isobaths (**Figure 2**; Rosel et al., 2016; Hayes et al., 2021).

To reduce the potential for vessel collisions, BOEM has issued NTL BOEM-2016-G01, which recommends protected species identification training and that vessel operators and crews maintain a vigilant watch for marine mammals and slow down or stop their vessel to avoid colliding with protected species and requires operators to report sightings of any injured or dead protected species. This NTL was reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) and the amendment in April 2021 (NMFS, 2021) replaces compliance with the NTL. When whales are sighted, vessel operators and crews are required to maintain a distance of 500 m (1,640 ft) or greater whenever possible (NTL BOEM-2016-G01; NMFS, 2020a, 2021). Vessel operators are required to reduce vessel speed to 10 knots or less, as safety permits, when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel (NTL BOEM-2016-G01). When a Rice's whale is sighted while a vessel is underway, the vessel should take action (e.g., attempt to remain parallel to the whale's course, avoid excessive speed or abrupt changes in direction until the whale has left the area) as necessary to avoid violating the relevant separation distance. However, if the whale is sighted within this distance, the vessel should reduce speed and shift the engine to neutral and not re-engage until the whale is outside of the separation area. This does not apply to any vessel towing gear (NMFS, 2021).

NTL BOEM 2023-G01 provides additional guidance on Rice's whale protection efforts within the expanded Rice's whale area, inclusive of all areas between the 100 and 400 m isobaths in the northern Gulf of Mexico. These include retaining vessel transit details if transiting within the expanded Rice's whale area, maintaining separation distances, and utilizing Automatic Identification System on vessels 65 ft or greater, among others. When baleen whales are sighted, vessel operators and crews are required to attempt to maintain a distance of 1,640 ft (500 m) or greater whenever possible (NMFS, 2020a, 2021). Vessel operators are required to reduce vessel speed to 10 knots or less, when safety permits, when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel. Compliance with these NTLs will minimize the likelihood of vessel strikes as well as reduce the chance for disturbing Rice's whales.

The current PBR level for the Gulf of Mexico stock of Rice's whale is 0.1 (Hayes et al., 2022). Mortality of a single Rice's whale would constitute a significant impact to the local (Gulf of Mexico) stock of Rice's whales. However, it is very unlikely that Rice's whale occurs within the project area, including the transit corridor for support vessels; consequently, the probability of a vessel collision with this species is extremely low.

Helicopter traffic also has the potential to disturb Rice's whales and based on studies of cetacean responses to sound, the observed responses to brief overflights by aircraft were short-term and limited to behavioral disturbances (Smultea et al., 2008). Helicopters maintain altitudes above 213 m (700 ft) during transit to and from the offshore working area. In the event that a whale is observed during transit, the helicopter will not approach or circle the animal(s). In addition, guidelines and regulations issued by NMFS under the authority of the MMPA specify that helicopters maintain an altitude of 305 m (1,000 ft) within 100 m (328 ft) of marine mammals (BOEM, 2016a; 2017; NMFS, 2020a). Due to the brief potential for disturbance the low density of Rice's whales in the Gulf of Mexico, no significant impacts are expected.

## Impacts of a Small Fuel Spill

Potential spill impacts on marine mammals are discussed by NMFS (2020a) and BOEM (2012a; 2015; 2016b; 2017; 2023a,b). Oil impacts on marine mammals are discussed by Geraci and St. Aubin (1990) and by the MMC (2011). In the unlikely event of a spill, implementation of bp's ROSRP will mitigate and reduce the potential for impacts on Rice's whales. Given the open ocean location of the project area and the brief duration of a small spill, any impacts are expected to be minimal.

A small fuel spill in offshore waters would produce a thin slick on the water surface and introduce concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the spill as well as the effectiveness of spill response measures.

**Section A.9.1** discusses the likely fate of a small fuel spill and indicates that more than 90% would evaporate or disperse naturally within 24 hours (NOAA, 2022). The area of diesel fuel on the sea surface would range from 1.2 to 12 ac (0.5 to 5 ha), depending on sea state and weather conditions at the time of a spill.

Direct physical and physiological effects of exposure to diesel fuel could include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil directly or via contaminated prey; and stress from the activities and sound of response vessels and aircraft (MMC, 2011). However, due to the limited areal extent and short duration of water quality impacts from a small fuel spill, as well as the mobility of Rice's whales and the unlikelihood of occurrence in the project area, no significant impacts are expected.

## Impacts of a Large Oil Spill

Potential spill impacts on marine mammals are discussed by BOEM (2012a; 2015; 2016b; 2017; 2023a,b), NMFS (2020a), Geraci and St. Aubin (1990), and the MMC (2011). Potential impacts of a large oil spill on Rice's whales could include direct impacts from oil exposure as well as indirect impacts due to response activities and materials (e.g., vessel traffic, sound, and dispersants) (MMC, 2011). Direct physical and physiological effects could include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil (and dispersants) directly or via contaminated prey; and stress from the activities and sound of response vessels and aircraft. The level of impact of oil exposure depends on the amount, frequency, and duration of exposure; route of exposure; and type or condition of petroleum compounds or chemical dispersants (Hayes et al., 2019). Complications of the above may lead to dysfunction of immune and reproductive systems, physiological stress, declining physical condition, and death. Behavioral responses can include displacement of animals from prime habitat, disruption of social structure, changing prey availability and foraging distribution and/or patterns, changing reproductive behavior/productivity, and changing movement patterns or migration (MMC, 2011).

In the event of a large spill, the level of vessel and aircraft activity associated with spill response could disturb Rice's whales and potentially result in vessel collisions, entanglement, or other injury or stress. Response vessels are expected to operate in accordance with NTLs BOEM-2016-G01, BOEM-2023-G01, and NMFS (2020a, 2021a) (see **Table 1**) to reduce the potential for colliding with or disturbing these animals. In the event of oil from a large spill contacting Rice's whales, it is expected that impacts resulting in the injury or death of individual

Rice's whales would be significant based on the current PBR level for the Gulf of Mexico subspecies and stock (0.1). Mortality of a single Rice's whale would constitute a significant impact to the local (Gulf of Mexico) stock of Rice's whales. The core distribution area for Rice's whales is within the eastern Gulf of Mexico OCS Planning Area; therefore, it is unlikely that Rice's whales would occur within the project area. Consequently, the probability of spilled oil from a project-related well blowout reaching Rice's whales is extremely low.

### **C.3.3 West Indian Manatee (Threatened)**

Most of the Gulf of Mexico manatee population is located in peninsular Florida, but manatees have been seen as far west as Texas during the summer (USFWS, 2001a). A species description is presented in the West Indian manatee recovery plan (USFWS, 2001a). Critical habitat of the West Indian manatee has been designated in southwest Florida.

Manatee sightings in Louisiana have increased as the species extends its presence farther west of Florida in the warmer months (Wilson, 2003). Manatees are typically found in coastal and riverine habitats, but have been seen on rare occasions in deepwater areas, during colder months when they seek refuge from colder coastal waters (USFWS, 2001a; Fertl et al., 2005; Pabody et al., 2009). There have been three verified reports of Florida manatee sightings by PSOs on the OCS during seismic mitigation surveys in mean water depths of over 600 m (1,969 ft) (Barkaszi and Kelly, 2019).

IPFs that potentially may affect manatees include support vessel and helicopter traffic and a large oil spill. A small fuel spill in the project area would be unlikely to affect manatees, as the project area is approximately 116 statute miles (187 km) from the nearest shoreline (Louisiana).

As explained in **Section A.9.1**, a small fuel spill would not be expected to make landfall or reach coastal waters prior to dissipating. Compliance with BSEE-NTL 2015-G03 is intended to minimize the potential for marine debris-related impacts on manatees.

#### **Impacts of Support Vessel and Helicopter Traffic**

Support vessel traffic has the potential to disturb manatees, and there is also a risk of vessel collisions, which are identified as a threat in the recovery plan for this species (USFWS, 2001a). Manatees are expected to be limited to shelf and coastal waters, and impacts are expected to be limited to transits of these vessels and helicopters through these waters. To reduce the potential for vessel collisions, BOEM issued NTL 2016-G01, which recommends protected species identification training for vessel operators and that vessels slow down or stop their vessel to avoid colliding with protected species. NTL 2016-G01 was reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) replaces compliance with the NTL and in an amendment published in April 2021 (NMFS, 2021a). Vessel collision avoidance measures described in NMFS (2020a, 2021) for the marine mammal species managed by that agency may also provide some additional indirect protections to manatees. If a manatee is sighted, vessels associated with the operation should operate at no wake/idle speed within that area, follow routes in deep water whenever possible, and attempt to maintain a distance of 50 m (164 ft) if practical. This does not apply to any vessel towing gear (e.g., source towed array and site clearance trawling).

Compliance with these mitigation measures will minimize the likelihood of vessel collisions as well as reduce the chance for disturbing manatees during daylight hours. The current PBR level for the Florida subspecies of West Indian manatee is 14 (USFWS, 2014). In the event of a vessel collision during support vessel transits, the mortality of a single manatee would constitute an adverse but insignificant impact to the subspecies.

Helicopter traffic has the potential to disturb manatees and Rathbun (1988) reported that manatees were disturbed more by low-flying 20 to 160 m (66 to 525 ft) helicopters than by fixed-wing aircraft. Helicopters used in support operations maintain a minimum altitude of 213 m (700 ft) while in transit offshore, 305 m (1,000 ft) over unpopulated areas or across coastlines, and 610 m (2,000 ft) overpopulated areas and sensitive habitats such as wildlife refuges and park properties. In addition, guidelines and regulations specify that helicopters maintain an altitude of 305 m (1,000 ft) within 100 m (328 ft) of marine mammals (BOEM, 2017; NMFS, 2020a, 2021a). This helicopter traffic mitigation measure will minimize the potential for disturbing manatees and results in no expected impacts.

### **Impacts of a Large Oil Spill**

The potential for significant impacts to manatees from a large oil spill would be most likely associated with coastal oiling in areas of manatee habitats. The 30-day OSRA modeling (**Table 4**) indicates nearshore waters and embayments from Matagorda County, Texas to Plaquemines Parish, Louisiana could be affected within 30 days of spill (1% to 4% conditional probability).

In the event that manatees were exposed to oil, effects could include direct impacts from oil exposure as well as indirect impacts due to response activities and materials (e.g., vessel traffic, marine sound, and dispersants) (MMC, 2011). Direct physical and physiological effects can include asphyxiation, acute poisoning, lowering of tolerance to other stress, nutritional stress, and inflammation from infection (BOEM, 2017). Indirect impacts include stress from the activities and sound of response vessels and aircraft. Complications of the above may lead to dysfunction of immune and reproductive systems, physiological stress, declining physical condition, and death. Behavioral responses can include displacement of animals from prime habitat, disruption of social structure, changing foraging distribution and/or patterns, changing reproductive behavior/productivity, and changing movement patterns or migration (MMC, 2011).

In the event that a large spill reached coastal waters where manatees were present, the level of vessel and aircraft activity associated with spill response could disturb manatees and potentially result in vessel collisions, entanglement, or other injury or stress. Response vessels would be expected to operate in accordance with NTL BOEM-2016-G01 and NMFS (2020a, 2021a) (see **Table 1**) to reduce the potential for colliding with or disturbing these animals. The current PBR level for the Florida subspecies of West Indian manatee is 14 (USFWS, 2014). It is not anticipated that groups of manatees would occur in coastal waters of the north central Gulf of Mexico; therefore, in the event of mortality of individual manatees from a large oil spill would constitute an adverse but insignificant impact to the subspecies.

### **C.3.4 Non-Endangered Marine Mammals (Protected)**

Excluding the three Endangered or Threatened species that have been discussed previously, there are 20 additional species of whales and dolphins (cetaceans) that may be found in the Gulf of Mexico, including dwarf and pygmy sperm whales (*Kogia sima* and *K. breviceps*), four species of beaked whales, and 14 species of delphinid whales (dolphins). All marine mammals

are protected species under the MMPA. The most common non-endangered cetaceans in the deepwater environment are small odontocetes such as the pantropical spotted dolphin (*Stenella attenuata*), spinner dolphin (*S. longirostris*), and bottlenose dolphin (*Tursiops truncatus*). A brief summary is presented below, and additional information on these groups is presented by BOEM (2017).

Dwarf and pygmy sperm whales. At sea, it is difficult to differentiate dwarf sperm whales from pygmy sperm whales, and sightings are often grouped together as *Kogia* spp. Both species have a worldwide distribution in temperate to tropical waters. In the Gulf of Mexico, both species occur primarily along the continental shelf edge and in deeper waters off the continental shelf (Mullin et al., 1991; Mullin, 2007; Waring et al., 2016). Either species could occur in the project area.

Beaked whales. Four species of beaked whales are known to occur in the Gulf of Mexico: Blainville's beaked whale (*Mesoplodon densirostris*), Sowerby's beaked whale (*M. bidens*), Gervais' beaked whale (*M. europaeus*), and Cuvier's beaked whale (*Ziphius cavirostris*). Stranding records as well as passive acoustic monitoring in the Gulf of Mexico (Hildebrand et al., 2015) suggest that Gervais' beaked whale and Cuvier's beaked whale are the most common species in the region. The Sowerby's beaked whale is considered extralimital, with one documented stranding reported in the Gulf of Mexico by Bonde and O'Shea (1989). There are a number of extralimital strandings and sightings reported beyond the recognized range of Sowerby's beaked whale (e.g., Canary Islands, Mediterranean Sea), including from the eastern Gulf of Mexico (Pitman and Brownell, 2020). Blainville's beaked whales are rare, with only four documented strandings in the northern Gulf of Mexico (Würsig et al., 2000) and three sightings in the Gulf of Mexico (Hayes et al., 2021).

Due to the difficulties of at-sea identification, beaked whales in the Gulf of Mexico are identified either as Cuvier's beaked whales or are grouped into an undifferentiated species complex (*Mesoplodon* spp.). In the northern Gulf of Mexico, they are broadly distributed in water depths greater than 1,000 m (3,281 ft) over lower slope and abyssal landscapes (Davis et al., 2000; Hildebrand et al., 2015). Any of these species could occur in the project area (Hayes et al., 2022).

Delphinids. Fourteen species of delphinids are known from the Gulf of Mexico, including Atlantic spotted dolphin (*Stenella frontalis*), bottlenose dolphin (*Tursiops truncatus*), Clymene dolphin (*Stenella clymene*), false killer whale (*Pseudorca crassidens*), Fraser's dolphin (*Lagenodelphis hosei*), killer whale (*Orcinus orca*), melon-headed whale (*Peponocephala electra*), pantropical spotted dolphin, pygmy killer whale (*Feresa attenuata*), short-finned pilot whale (*Globicephala macrorhynchus*), Risso's dolphin (*Grampus griseus*), rough-toothed dolphin (*Steno bredanensis*), spinner dolphin, and striped dolphin (*Stenella coeruleoalba*). Any of these species could occur in the project area (Hayes et al., 2022).

The bottlenose dolphin is a common inhabitant of the northern Gulf of Mexico, particularly within continental shelf waters. There are two ecotypes of bottlenose dolphins, a coastal form and an offshore form, which are genetically isolated from each other (Waring et al., 2016). The offshore form of the bottlenose dolphin may occur within the project area. Inshore populations of coastal bottlenose dolphins in the northern Gulf of Mexico are separated into 31 geographically distinct population units, or stocks, for management purposes by NMFS (Hayes et al., 2022).

IPFs that potentially may affect non-endangered marine mammals include drilling rig presence, marine sound, and lights; support vessel and helicopter traffic; and two types of accidents (a small fuel spill and a large oil spill). Effluent discharges are likely to have negligible impacts on marine mammals due to rapid dispersion, the small area of ocean affected, the intermittent nature of the discharges, and the mobility of marine mammals. Compliance with NTL BSEE-2015-G03 is expected to minimize the potential for marine debris-related impacts on marine mammals.

### **Impacts of Drilling Rig Presence, Marine Sound, and Lights**

The presence of the drilling rig and the presents an attraction to pelagic food sources that may attract cetaceans. Some odontocetes have shown increased feeding activity around lighted platforms at night (Todd et al., 2009). Therefore, prey congregation could pose an attraction to protected species that exposes them to higher levels or longer durations of sound that might otherwise be avoided. Drilling and support vessel presence and lighting are not considered as IPFs for marine mammals (BOEM, 2017).

If the vessel(s) are equipped with a moon pool, a trained crew member or company representative must monitor the moon pool area for marine mammals during operations. If a marine mammal is detected in the moon pool, immediate reporting to NMFS, BOEM, and BSEE is required (NMFS, 2020a).

Sound from routine drilling operations has the potential to disturb marine mammals. As discussed in **Section A.1**, sound impacts would be expected at greater distances when DP thrusters are in use than with vessel and drilling sound alone and are dependent on variables relating to sea state conditions, thruster type and usage. Three functional hearing groups are represented in the 20 non-endangered cetaceans found in the Gulf of Mexico. Eighteen of the 20 odontocete species are considered to be in the mid-frequency functional hearing group and two species (*Kogia* spp.) are in the high frequency functional hearing group, (NMFS, 2018a). Thruster and drilling sound will affect each group differently depending on the frequency bandwidths produced by operations. Generally, sound produced by drilling rigs on DP is dominated by frequencies below 10 kHz. Thus, drilling rig DP sound sources are out of the audible range for the high frequency group.

For mid frequency cetaceans exposed to a non-impulsive source (like drilling operations), permanent threshold shifts are estimated to occur when the mammal has received an SEL of 198 dB re 1  $\mu\text{Pa}^2 \text{ s}$  over a 24-hour period. Similarly, temporary threshold shifts are estimated to occur when the mammal has received an SEL of 178 dB re 1  $\mu\text{Pa}^2 \text{ s}$  over a 24-hour period. Due to the transient nature of marine mammals and the stationary nature of the proposed activities, it is not expected that any marine mammals will remain within the ensonified area for a full 24-hour period to receive SEL necessary for the onset of auditory threshold shifts.

NMFS (2018a) presents criteria used to determine physiological (i.e., injury) thresholds for marine mammals but the behavioral disturbance thresholds were not updated in this most recent acoustic guidance; these behavioral disturbance thresholds are established and published by NMFS in 70 FR 1871. Received SPL of 120 dB re 1  $\mu\text{Pa}$  from a non-impulsive, continuous source is considered high enough to elicit a behavioral reaction in some marine mammal species. The 120-dB isopleth may extend tens to hundreds of kilometers from the source depending on the propagation environment. However, in the case of behavioral responses,

received levels alone do not indicate a behavioral response and, more importantly, do not equate to biologically important responses (Southall et al., 2016; Ellison et al., 2012).

There are other OCS facilities and activities near the project area, and the region as a whole has a large number of similar sources. Marine mammal species in the northern Gulf of Mexico have been exposed to sound from anthropogenic sources for a long period of time and over large geographic areas and likely do not represent a naïve population with regard to sound (National Research Council, 2003b). Due to the limited scope, timing, and geographic extent of drilling activities, this project would represent a small, temporary contribution to the overall soundscape, and any short-term behavioral impacts are not expected to be biologically significant to marine mammal populations. Drilling rig and support vessel lighting and presence are not identified as IPFs for marine mammals by BOEM (2017).

### **Impacts of Support Vessel and Helicopter Traffic**

Support vessel traffic has the potential to disturb marine mammals, and there is also a risk of vessel collisions. Data concerning the frequency of vessel collisions are presented by BOEM (2012a). To reduce the potential for vessel collisions, BOEM issued NTL 2016-G01, which recommends protected species identification training for vessels operators and that vessels slow down or stop to avoid colliding with protected species. This NTL was reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) replaces compliance with the NTL. The NTL also requires that operators and crews maintain a vigilant watch for marine mammals and report sightings of any injured or dead protected species. Vessel operators and crews are required to attempt to maintain a distance of 100 m (328 ft) or greater when toothed whales are sighted and 50 m (164 ft) when small cetaceans are sighted (NMFS, 2020a). When cetaceans are sighted while a vessel is underway, vessels must attempt to remain parallel to the animal's course and avoid excessive speed or abrupt changes in direction until the cetacean has left the area. Vessel operators are required to reduce vessel speed to 10 knots or less when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel, when safety permits. These mitigation measures are only effective during daylight hours, or in sea and weather conditions where cetaceans are sighted. All vessels must, to the maximum extent practicable, attempt to maintain a minimum separation distance of 50 m from all "other aquatic protected species" including sea turtles, with an exception made for those animals that approach the vessel. Vessel speeds must also be reduced to 10 knots or less when mother/calf pairs, pods, or large assemblages (greater than three) of any marine mammal are observed near a vessel. Although vessel strike avoidance measures described in NMFS (2020a) are only applicable to ESA-listed species, complying with them may provide additional indirect protections to non-listed species as well.

When aquatic protected species are sighted while a vessel is underway, the vessel should take action as necessary to avoid violating the relevant separation distance (e.g., attempt to remain parallel to the animal's course, avoid excessive speed or abrupt changes in direction until the animal has left the area). If aquatic protected species are sighted within the relevant separation distance, the vessel should reduce speed and shift the engine to neutral, not engaging the engines until animals are clear of the area. This does not apply to any vessel towing gear (e.g., source towed array, site clearance trawling). Use of these measures will minimize the likelihood of vessel collisions as well as reduce the chance for disturbing marine mammals, and therefore no significant impacts are expected.

The current PBR level for several non-endangered cetacean species in the Gulf of Mexico are less than 3 individuals (e.g., rough-toothed dolphin = undetermined, Clymene dolphin = 2.5, Fraser's dolphin = 1.0, killer whale = 1.5, pygmy and false killer whales = 2.8, dwarf and pygmy sperm whales = 2.5) (Hayes et al., 2022). Mortality of individuals equal to or in excess of their PBR level would constitute a significant impact at a population level to the local (Gulf of Mexico) stocks of these species.

Helicopter traffic has the potential to disturb marine mammals (Würsig et al., 1998) but relatively high-altitude flying is conducted to minimize the potential for disturbances. While flying offshore, helicopters maintain altitudes above 213 m (700 ft) during transit to and from the working area. In addition, guidelines and regulations specify that helicopters maintain an altitude of 305 m (1,000 ft) within 100 m (328 ft) of marine mammals (BOEM, 2012a; 2016a). Maintaining these altitudes during helicopter operations will minimize the potential for disturbing marine mammals, and no significant impacts are expected (BOEM, 2017; NMFS, 2020a).

### **Impacts of a Small Fuel Spill**

Potential spill impacts on marine mammals are discussed by BOEM (2017; 2023a,b). Oil impacts on marine mammals in general are discussed by Geraci and St. Aubin (1990). For this EP, there are no unique site-specific issues with respect to spill impacts on these animals.

The probability of a fuel spill is expected to be minimized by bp's preventative measures during fuel transfer. In the unlikely event of a spill, implementation of bp's ROSRP is expected to lessen the potential for impacts on marine mammals. EP Appendix G provides detail on spill response measures, and those measures are summarized in the EIA. Given the open ocean location of the project area, the limited duration of a small spill, and response efforts, it is expected that any impacts would be brief and minimal.

A small fuel spill in offshore waters would produce a thin slick on the water surface and introduce the concentrations of petroleum hydrocarbons and their degradation products. Direct physical and physiological effects of exposure to diesel fuel could include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil directly or via contaminated prey; and stress from the activities and sound of response vessels and aircraft (MMC, 2011). The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. A small fuel spill would not be expected to make landfall or reach coastal waters prior to dissipating (**Section A.9.1**). Therefore, due to the limited areal extent and short duration of water quality impacts from a small fuel spill as well as the mobility of marine mammals, no significant impacts would be expected.

## Impacts of a Large Oil Spill

Potential spill impacts on marine mammals are discussed by BOEM (2017; 2023a,b). For this EP, there are no unique site-specific issues. Impacts of oil spills on marine mammals can include direct impacts from oil exposure as well as indirect impacts due to response activities and materials (e.g., vessel traffic, marine sound, and dispersants) (MMC, 2011). Direct physical and physiological effects can include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil (and dispersants) directly or via contaminated prey. Complications of the above may lead to dysfunction of immune and reproductive systems (De Guise et al., 2017), physiological stress, declining physical condition, and death. Indirect impacts could include stress from the activities and sound of response vessels and aircraft. Behavioral responses can include displacement of animals from prime habitat (McDonald et al., 2017), disruption of social structure, change in prey availability and foraging distribution or patterns, change in reproductive behavior/productivity, and change in movement patterns or migration (MMC, 2011).

In the event of a large spill, response activities that may impact marine mammals include increased vessel traffic and remediation activities (e.g., use of dispersants, controlled burns, skimmers, boom, etc.) (BOEM, 2017). The increased level of vessel and aircraft activity associated with spill response could disturb marine mammals, potentially resulting in behavioral changes. The large number of response vessels could result in vessel collisions, entanglement or other injury, or stress. Response vessels are expected to operate in accordance with NTL BOEM-2016-G01 to reduce the potential for colliding with or disturbing these animals, and therefore no significant impacts are expected.

This NTL was reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) and amendment in April 2021 (NMFS, 2021a) replaces compliance with the NTL. The application of dispersants greatly reduces exposure risks to marine mammals as the dispersants would remove oil from the surface thereby reducing the risk of contact and rendering it less likely to adhere to skin, baleen plates, or other body surfaces (BOEM, 2017). Based on the current PBR level for several non-endangered cetacean species in the Gulf of Mexico that are less than 3 individuals (e.g., rough-toothed dolphin = undetermined, Clymene dolphin = 2.5, Fraser's dolphin = 1.0, killer whale = 1.5, pygmy and false killer whales = 2.8, dwarf and pygmy sperm whales = 2.5) (Hayes et al., 2022), mortality of individuals equal to or in excess of their PBR level would constitute a significant impact at the population level to the local (Gulf of Mexico) stocks of these species.

### C.3.5 Sea Turtles (Endangered/Threatened)

Five species of Endangered or Threatened sea turtles may be found near the project area. Endangered species include the leatherback, Kemp's ridley, and hawksbill turtles. As of 6 May 2016, the entire North Atlantic DPS of the green turtle is listed as Threatened (81 FR 20057). The DPS of loggerhead turtles that occurs in the Gulf of Mexico is listed as Threatened.

Critical habitat has been designated for the loggerhead turtle in the Gulf of Mexico as shown in **Figure 4**. Loggerhead turtles in the Gulf of Mexico are part of the Northwest Atlantic Ocean DPS (76 FR 58868). In July 2014, NMFS and the USFWS designated critical habitat for this DPS (NMFS, 2021b). The USFWS designation (79 FR 39756) includes nesting beaches in Jackson County, Mississippi; Baldwin County, Alabama; and Bay, Gulf, and Franklin Counties in the Florida Panhandle as well as several counties in southwest Florida and the Florida Keys (and other areas along the Atlantic coast). The NMFS designation (79 FR 39856) includes nearshore reproductive habitat within 0.99 miles (1.6 km) seaward of the mean high-water line along these same nesting beaches. NMFS also designated a large area of shelf and oceanic waters, termed *Sargassum* habitat, in the Gulf of Mexico (and Atlantic Ocean) as critical habitat. *Sargassum* is a brown algae (Class Phaeophyceae) that takes on a planktonic, often epipelagic existence after being removed from reefs during rough weather. Rafts of *Sargassum* serve as important foraging and developmental habitat for numerous fishes, and young sea turtles, including loggerhead, green, hawksbill, and Kemp's ridley turtles (Witherington et al., 2012). NMFS designated three other categories of critical habitat; of these, two (migratory habitat and overwintering habitat) are along the Atlantic coast and the third (breeding habitat) is found in the Florida Keys and along the Florida east coast (NMFS, 2021b).

The nearest designated nearshore reproductive critical habitat for loggerhead sea turtles is approximately 248 statute miles (399 km) from the project area. The project area is located within the designated *Sargassum* critical habitat for loggerhead sea turtles (**Figure 4**).

Leatherbacks are the species most likely to be present near the project area, as they are the most pelagic of the sea turtles and feed on populations of gelatinous plankton, such as jellyfish and salps in all water depths. Loggerhead, green, hawksbill, and Kemp's ridley turtles are typically inner-shelf and nearshore species but may be found transiting in oceanic waters during seasonal migrations. Loggerheads and green turtles are more likely to occur or be attracted to offshore structures than the other species. Hatchlings or juveniles of any of the sea turtle species with the exception of leatherbacks may be present in deepwater areas, including the project area, where they may be associated with *Sargassum* rafts and other flotsam. Leatherbacks, while not specifically associated with *Sargassum*, do utilize similar pelagic habitats for foraging where *Sargassum* is routinely found. All five sea turtle species in the Gulf of Mexico are migratory and use different marine habitats according to their life stage. These habitats include high-energy beaches for nesting females and emerging hatchlings and pelagic convergence zones for hatchling and juvenile turtles. As adults, green, hawksbill, and loggerhead turtles forage primarily in shallow, benthic habitats.

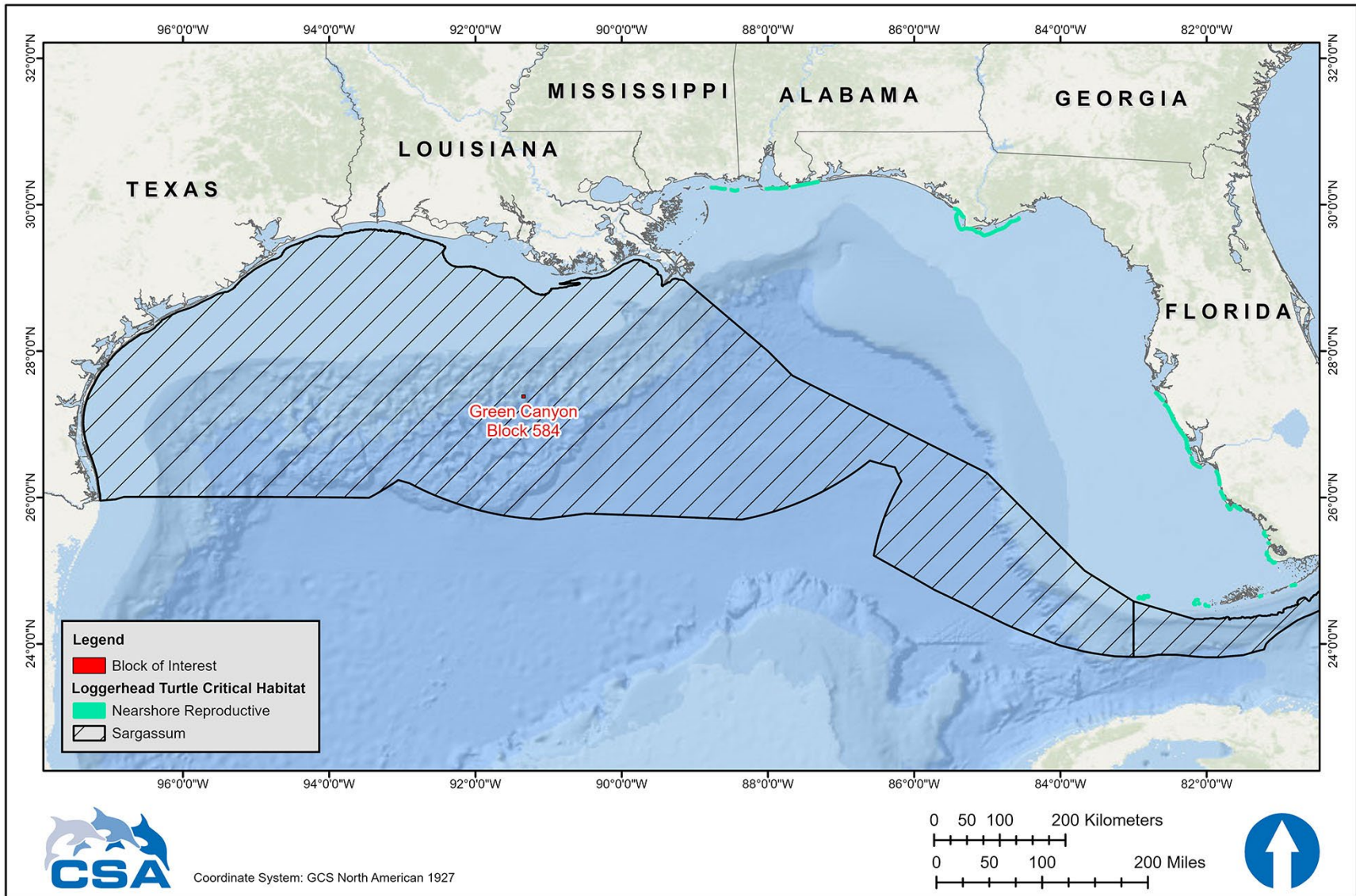


Figure 4. Location of loggerhead turtle designated *Sargassum* critical habitat and nearshore reproductive critical habitat in relation to the project area.

Sea turtle nesting in the northern Gulf of Mexico can be summarized by species as follows:

- Loggerhead turtles – Loggerhead turtles nest in significant numbers along the Florida Panhandle (Florida Fish and Wildlife Conservation Commission, nd-a) and, to a lesser extent, from Texas through Alabama (NMFS and USFWS, 2008);
- Green turtles – Green turtles are known to nest along the Florida Panhandle and in southwest Florida, from Tampa Bay south to Ten Thousand Island, and in the Florida Keys and Dry Tortugas (Florida Fish and Wildlife Conservation Commission, nd-b);
- Leatherback turtles – Leatherback turtles infrequently nest on Florida Panhandle beaches (Florida Fish and Wildlife Conservation Commission, nd-c);
- Kemp’s ridley turtles – The critically endangered Kemp’s ridley turtle nests almost exclusively on a 16-mile (26-km) stretch of coastline near Rancho Nuevo in the Mexican state of Tamaulipas (NMFS et al., 2011). A much smaller population nests in Padre Island National Seashore, Texas, mostly as a result of reintroduction efforts (NMFS et al., 2011). A total of 256 Kemp’s ridley turtle nests were counted in Texas in 2023. A total of 284 Kemp’s ridley turtle nests were counted on Texas beaches for the 2022 nesting season and total of 262 Kemp’s ridley turtle nests were counted on Texas beaches during the 2020 nesting season. This was an increase from 2019 (190 nests), but similar to 2018 (250 nests) (Turtle Island Restoration Network, 2023). Padre Island National Seashore along the coast of Willacy, Kenedy, and Kleberg Counties in southern Texas, is the most important nesting location for this species in the United States; and
- Hawksbill turtles – Hawksbill turtles typically do not nest anywhere near the project area, with most nesting in the region located in the Caribbean Sea and on the beaches of the Yucatán Peninsula (USFWS, 2016a).

IPFs that could potentially affect sea turtles include drilling rig presence, marine sound, and lights; support vessel and helicopter traffic; and two types of accidents (a small fuel spill and a large oil spill). Effluent discharges are likely to have negligible impacts on sea turtles due to rapid dispersion, the small area of ocean affected, and the intermittent nature of the discharges.

Though NMFS (2020a) stated marine debris as an IPF, compliance with NTL BSEE 2015-G013 (See **Table 1**) and NMFS (2020a) Appendix B will minimize the potential for marine debris-related impacts on sea turtles. NMFS (2020a) estimated a small proportion of individual sea turtles would be adversely affected from exposure to marine debris. Therefore, marine debris is likely to have negligible impacts on sea turtles and is not further discussed in this EIA (See **Table 2**).

### **Impacts of Drilling Rig Presence, Marine Sound, and Lights**

Drilling activities produce a broad array of sounds at frequencies and intensities that may be detected by sea turtles (Samuel et al., 2005, Popper et al., 2014). Potential impacts may include behavioral disruption and temporary or permanent displacement from the area near the sound source. Sea turtles can hear low to mid-frequency sounds and they appear to hear best between 200 and 750 Hz; they do not respond well to sounds above 2,000 Hz, although primary hearing frequency ranges vary per species and life stage (Ketten and Bartol, 2005; Dow Piniak et al., 2012a,b; Martin et al., 2012; Piniak et al., 2016).

The currently accepted hearing and response estimates for sea turtles are based on work conducted by the U.S. Navy (Finneran et al., 2017). These are applied in the NMFS Biological Opinion (NMFS, 2020a) which uses a zero-to-peak sound pressure level (PK) permanent

threshold shift (i.e., acoustic injury) threshold of 232 dB re 1  $\mu$ Pa, and an SEL<sub>24h</sub> threshold of 204 dB re 1  $\mu$ Pa<sup>2</sup> s. Behavioral thresholds for sea turtles are also based on work by the U.S. Navy (Blackstock et al., 2018) which recommends an SPL threshold of 175 dB re 1  $\mu$ Pa. Based on transmission loss calculations (see Urick, 1983), open water propagation of sound produced by typical sources with DP thrusters in use during drilling, are not expected to produce SPL greater than 175 dB re 1  $\mu$ Pa beyond a few meters from the source. Certain sea turtles, especially loggerheads, may be attracted to offshore structures (Lohoefer et al., 1990; Gitschlag et al., 1997; Colman et al., 2020) and thus may be more susceptible to impacts from sounds produced during routine drilling activities. Any impacts would likely be short-term behavioral changes such as diving and evasive swimming, disruption of activities, or departure from the area. Because of the limited scope and short duration of drilling activities, these short-term impacts are not expected to be biologically significant to sea turtle populations.

Artificial lighting can disrupt the nocturnal orientation of sea turtle hatchlings (Tuxbury and Salmon, 2005; Berry et al., 2013; Simões et al., 2017). However, hatchlings may rely less on light cues when they are offshore than when they are emerging on the beach (Salmon and Wyneken, 1990). NMFS (2007) concluded that the effects of lighting from offshore structures on sea turtles are insignificant.

NMFS (2020a) stated sea turtles have the potential to be entangled or entrapped in moon pools, and though many sea turtles could exit the moon pool under their own volition, sublethal effects could occur. If the vessel(s) are equipped with a moon pool, a trained crew member or company representative will monitor the moon pool area for sea turtles during operations. If a sea turtle is detected in the moon pool, it will be immediately reported to agencies including NMFS, BOEM, and BSEE per NMFS (2020a); compliance with ensuing agency guidance is expected. Resuscitation of any trapped sea turtles is expected to occur in compliance with NMFS (2020a) Appendix J. Based on the moon pool entrapment cases of sea turtles reported and successful rescues and releases that have occurred, NMFS (2020a) estimated approximately about one sea turtle will be sub lethally entrapped in moon pools every year. Therefore, no significant impacts are expected.

### **Impacts of Support Vessel and Helicopter Traffic**

Support vessel traffic has the potential to disturb sea turtles, and there is also a risk of vessel collisions. Data show that vessel traffic is one cause of sea turtle mortality in the Gulf of Mexico (Lutcavage et al., 1997). While adult sea turtles are visible at the surface during the day and in clear weather, they can be difficult to spot from a moving vessel when resting below the water surface, during nighttime, or during periods of inclement weather. To reduce the potential for vessel collisions, BOEM issued NTL BOEM-2016-G01, which addresses 1) protected species identification training; 2) vessel operators and crews' observational vigilance and protected species collision avoidance; and 3) reporting of sightings of any injured or dead protected species. This NTL was reissued in June 2020 to address instances where guidance in the 2020 NMFS Biological Opinion (NMFS, 2020a) and amendment in April 2021 replaces compliance with the NTL. When sea turtles are sighted, vessel operators and crews must, to the maximum extent possible, attempt to maintain a distance of 50 m (164 ft) or greater whenever possible (NMFS, 2021). When sea turtles are sighted while a vessel is underway, the vessel should take action as necessary to avoid violating the relevant separation distance (e.g., attempt to remain parallel to the animal's course, avoid excessive speed or abrupt changes in direction until the animal has left the area). If aquatic protected species are sighted within the relevant separation distance,

the vessel should reduce speed and shift the engine to neutral, not engaging the engines until animals are clear of the area. This does not apply to any vessel towing gear (e.g., source towed array and site clearance trawling). Compliance with these mitigation measures will minimize the likelihood of vessel collisions as well as reduce the chance for disturbing sea turtles. Therefore, no significant impacts are expected.

Sound generated from support helicopter traffic has the potential to disturb sea turtles but relatively high-altitude flying is conducted to minimize the potential for disturbances. While flying offshore, helicopters maintain altitudes above 213 m (700 ft) during transit to and from the working area. This altitude is intended to minimize the potential for disturbing sea turtles, and no significant impacts are expected (NMFS, 2007; BOEM, 2012a).

### **Impacts of a Small Fuel Spill**

Potential spill impacts on sea turtles are discussed by NMFS (2020a) and BOEM (2017; 2023a,b). For this EP, there are no unique site-specific issues with respect to spill impacts on sea turtles.

The probability of a fuel spill is expected to be minimized by bp's preventative measures during fuel transfer. In the unlikely event of a spill, implementation of bp's ROSRP is expected to minimize potential impacts on sea turtles. EP Appendix G provides details on spill response measures. Given the open ocean location of the project area, the duration of a small spill would be brief and the potential for impacts to occur would be minimal.

A small fuel spill in offshore waters would produce a thin slick on the water surface and introduce concentrations of petroleum hydrocarbons and their degradation products. Direct physical and physiological effects of exposure to diesel fuel could include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes; ingestion of oil directly or via contaminated prey; and stress from the activities and sound of response vessels and aircrafts (NMFS, 2020b). The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the release and the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that over 90% would be evaporated or dispersed naturally within 24 hours (NOAA, 2022). The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions. Therefore, due to the limited areal extent and short duration of water quality impacts from a small fuel spill, no significant impacts to sea turtles from direct or indirect exposure would be expected.

Loggerhead Critical Habitat – Nesting Beaches. A small fuel spill in the project area would be unlikely to affect sea turtle nesting beaches due to the distance from the nearest shoreline. Loggerhead turtle nesting beaches and nearshore reproductive habitat designated as critical habitat are located in Mississippi, Alabama, and the Florida Panhandle, at least 248 statute miles (399 km) from the project area. As explained in **Section A.9.1**, a small fuel spill would not be expected to make landfall or reach coastal waters prior to natural dispersion and degradation.

Loggerhead Critical Habitat – Sargassum. The project area is located within the designated *Sargassum* critical habitat for the loggerhead turtles (**Figure 3**). A small diesel fuel spill would likely affect *Sargassum* and juvenile turtles in this habitat. If juvenile sea turtles come into contact with or ingest diesel fuel, impacts could include death, injury, or other sublethal effects. However, effects of a small spill on *Sargassum* critical habitat for loggerhead turtles would be limited to the small area (0.5 to 5 ha [1.2 to 12 ac]) likely to be impacted by a small spill. An

impact area of 5 ha (12 ac) would represent a negligible portion of the approximately 40,662,810 ha (100,480,000 ac) designated *Sargassum* critical habitat for loggerhead turtles in the northern Gulf of Mexico. However, if juvenile sea turtles are present in the area impacted, significant impacts to the regional population could occur.

### Impacts of a Large Oil Spill

Impacts of oil spills on sea turtles can include direct impacts from oil exposure as well as indirect impacts due to response activities (e.g., vessel traffic, marine sound, and dispersant use). Direct physical and physiological effects can include skin irritation, inflammation, or necrosis; chemical burns of skin, eyes, and mucous membranes; inhalation of toxic fumes and smoke (e.g., from in situ burning of oil); ingestion of oil (and dispersants) directly or via contaminated food; and stress from the activities and marine sound of response vessels and aircraft. Complications of the above may lead to dysfunction of immune and reproductive systems, physiological stress, declining physical condition, and death. Behavioral responses can include displacement of animals from prime habitat, disruption of social structure, changing food availability and foraging distribution and/or patterns, changing reproductive behavior/productivity, and changing movement patterns or migration (NOAA, 2010; NMFS, 2020b). In the unlikely event of a spill, implementation of bp's ROSRP is expected to minimize the potential for these types of impacts on sea turtles. EP Appendix G provides further details on spill response measures.

Studies of oil effects on loggerhead turtles in a controlled setting (NOAA, 2010, Lutcavage et al., 1995) suggest that sea turtles show no avoidance behavior when they encounter an oil slick, and any sea turtle in an affected area would be expected to be exposed. Sea turtles' diving behaviors also put them at risk. Sea turtles rapidly inhale a large volume of air before diving and continually resurface over time, which may result in repeated exposure to volatile vapors and oiling (NMFS, 2007).

Loggerhead Critical Habitat – Nesting Beaches. If spilled oil reaches sea turtle nesting beaches, nesting sea turtles and egg development could be affected (NMFS, 2020a). An oiled beach could affect nest site selection or result in no nesting at all (e.g., false crawls). Upon hatching and successfully reaching the water, hatchlings are subject to the same types of oil spill exposure hazards as adults. Hatchlings that contact oil residues while crossing a beach can exhibit a range of effects, from acute toxicity to impaired movement and normal bodily functions (NMFS, 2007).

The 30-day OSRA modeling (**Table 4**) indicates nearshore waters and embayments from Matagorda County Texas to Plaquemines Parish, Louisiana could be affected within 30 days of a spill (1% to 2% conditional probability).

Loggerhead Critical Habitat – *Sargassum*. The project area is located within the designated *Sargassum* critical habitat for the loggerhead turtles which includes most of the Western and Central Planning Areas in the Gulf of Mexico and parts of the southern portion of the Eastern Planning Area (**Figure 3**) (NMFS, 2021b). Because of the large area covered by the designated *Sargassum* critical habitat for loggerhead turtles, a large spill could result in a substantial part of the *Sargassum* critical habitat in the northern Gulf of Mexico being oiled. The 2010 *Deepwater Horizon* spill affected approximately one-third of the *Sargassum* habitat in the northern Gulf of Mexico (BOEM, 2014a). It is extremely unlikely that the entire *Sargassum* critical habitat would be affected by a large spill. Because *Sargassum* is a floating, pelagic species, it would only be affected by impacts that occur near the surface.

The effects of oiling on *Sargassum* vary with spill severity, but moderate to heavy oiling that could occur during a large spill could cause complete mortality to floating *Sargassum* and its associated communities (BOEM, 2017). *Sargassum* also has the potential to sink during a large spill, thus temporarily removing the habitat and possibly being an additional pathway of exposure to the benthic environment (Powers et al., 2013). Lower levels of oiling may cause sub-lethal affects, including a reduction in growth, productivity, and recruitment of organisms associated with the *Sargassum*. The *Sargassum* algae itself could be less impacted by light to moderate oiling than associated organisms because of a waxy outer layer that might help protect it from oiling (BOEM, 2016b). *Sargassum* has a yearly seasonal cycle of growth and a yearly cycle of migration from the Gulf of Mexico to the western Atlantic. A large spill could affect a large portion of the annual crop of the algae; however, because of its ubiquitous distribution and seasonal cycle, recovery of the *Sargassum* community would be expected to occur within one to two years (BOEM, 2017).

Impacts to sea turtles from a large oil spill and associated cleanup activities would depend on spill extent, duration, and season (relative to turtle nesting season); the amount of oil reaching the shore; the importance of specific beaches to sea turtle nesting; and the level of cleanup vessel and beach crew activity required. In the event of oil from a large spill, it is expected that impacts resulting in the injury or death of individual sea turtles would be adverse but not likely significant at the population level. In the event that spilled oil reached nesting beaches during nesting period(s), the level of mortality (and impact) would increase.

### **C.3.6 Piping Plover (Threatened)**

The Piping Plover is a migratory shorebird that overwinters along the southeastern U.S. and Gulf of Mexico coasts. This Threatened species experienced declines in population as a result of hunting, habitat loss and modification, predation, and disease (USFWS, 2003). However, as a result of intensive conservation and management, populations of Piping Plover appear to have been increasing since 1991 throughout its range (BirdLife International, 2020). Critical overwintering habitat has been designated, including beaches in Texas, Louisiana, Mississippi, Alabama, and Florida (**Figure 2**). Piping Plovers inhabit coastal sandy beaches and mudflats, feeding by probing for invertebrates at or just below the surface. They use beaches adjacent to foraging areas for roosting and preening.

A large oil spill is the only IPF that potentially may affect Piping Plovers. There are no IPFs associated with routine project activities that could affect these birds. A small fuel spill in the project area would be unlikely to affect Piping Plovers because a small fuel spill would not be expected to make landfall or reach coastal waters prior to dissipating (see explanation in **Section A.9.1**). Sound from helicopters would be unlikely to significantly affect piping plover populations, because it is assumed that helicopters will maintain an altitude of 305 m (1,000 ft) over unpopulated areas or across coastlines.

## Impacts of a Large Oil Spill

The project area is approximately 116 statute miles (187 km) from the nearest shorelines designated as critical habitat for the Piping Plover (**Figure 2**). The 30-day OSRA modeling (**Table 4**) predicts that Piping Plover critical habitat in Texas and Louisiana could be contacted within 30 days of a spill (1% to 4% conditional probability).

Plovers could physically oil themselves while foraging on oiled shores or secondarily contaminate themselves through ingestion of oiled intertidal sediments and prey (BOEM, 2017). Piping Plovers congregate and feed along tidally-exposed banks and shorelines, following the tidal boundary and foraging at the water's edge. It is possible that some deaths of Piping Plovers could occur, especially if spills occur during winter months when plovers are most common along the coastal Gulf or if spills contacted critical habitat. Impacts could also occur from vehicular traffic on beaches and other activities associated with spill cleanup. Extensive bp resources will be available to protect and rehabilitate wildlife in the event of a spill reaching the shoreline, as detailed in the ROSRP.

However, a large spill that contacts shorelines would not necessarily substantially impact Piping Plovers. In the aftermath of the *Deepwater Horizon* incident, Gibson et al. (2017) completed thorough surveys of coastal Piping Plover habitat in coastal Louisiana, Mississippi, and Alabama and found that only 0.89% of all observed Piping Plovers were visibly oiled, leaving the authors to conclude that the *Deepwater Horizon* incident did not substantially affect Piping Plover populations.

### C.3.7 Whooping Crane (Endangered)

The Whooping Crane is a large omnivorous wading bird listed as an Endangered species. Three wild populations live in North America (National Wildlife Federation, 2016). One population overwinters along the Texas coast at Aransas NWR and summers at Wood Buffalo National Park in Canada. This population represents the majority of the world's population of free-ranging Whooping Cranes, reaching an estimated population of 536 at Aransas NWR during the 2022 to 2023 winter (USFWS, 2023a), a slight decrease from an estimated 543 individuals counted in the 2021 to 2022 winter survey. Whooping Cranes breed, migrate, winter, and forage in a variety of habitats, including coastal marshes and estuaries, inland marshes, lakes, ponds, wet meadows and rivers, and agricultural fields (USFWS, 2007). About 9,000 ha (22,240 ac) of salt flats on Aransas NWR and adjacent islands comprise the principal wintering grounds of the Whooping Crane. Aransas NWR is designated as critical habitat for the species.

A large oil spill is the only IPF that potentially may affect Whooping Cranes. A small fuel spill in the project area would also be unlikely to affect Whooping Cranes, due to the distance of the project area from Aransas NWR. As explained in **Section A.9.1**, a small fuel spill would not be expected to make landfall or reach coastal waters prior natural dispersion and degradation.

## Impacts of a Large Oil Spill

A large oil spill is unlikely to affect Whooping Cranes as the project area is approximately 318 statute miles (512 km) from the Aransas NWR, which is the nearest designated critical habitat. The 30-day OSRA modeling (**Table 4**) predicts a <0.5% or less chance of oil contacting Whooping Crane critical habitat within 30 days of a spill.

In the event of oil exposure, Whooping Cranes could physically oil themselves while foraging in oiled areas or secondarily contaminate themselves through ingestion of contaminated shellfish, frogs, and fishes. It is possible that some Whooping Crane deaths could occur, especially if a spill occurred during winter months when Whooping Cranes are most common along the Texas coast and if the spill contacts their critical habitat in Aransas NWR. Impacts could also occur from vehicular traffic on beaches and other activities associated with spill cleanup. In the event of a spill, bp would work with the applicable state and federal agencies to prevent impacts on Whooping Cranes. Extensive bp resources will be available to protect and rehabilitate wildlife in the event of a spill reaching the shoreline, as detailed in the ROSRP.

### **C.3.8 Black-capped Petrel**

The Black-capped Petrel is a pelagic seabird that solely nests on Hispaniola that was listed as Endangered under the ESA in 2024. The species travels long distances to forage on fish, squid, crustaceans, and *Sargassum* (Simons et al., 2013) and have occasionally been sighted in the northern Gulf of Mexico. While the Gulf of Mexico is not their primary foraging grounds, the most recent species status review (USFWS, 2023b) reported 11 sightings in the Gulf of Mexico in 2017-2018 during surveys as part of the Gulf of Mexico Marine Assessment Program for Protected Species. Overall, the population of Black-capped Petrels is declining, largely due to deforestation and urbanization on Hispaniola. Exact population numbers are unknown due to the difficulty in obtaining accurate counts and their nocturnal nature, but BirdLife International (2018) estimated a total of 1,000 to 2,000 mature individuals and an overall population of 2,000 to 4,000 individuals.

IPFs that potentially may affect the Black-capped Petrel include drilling rig and presence, marine sound, lighting, support vessel and helicopter traffic; and two types of accidents (a small fuel spill and a large oil spill). Effluent discharges permitted under the NPDES are likely to have negligible impacts on the birds due to rapid dispersion, the small area of ocean affected, the intermittent nature of the discharges, and the mobility of these animals. Compliance with NTL BSEE-2015-G03 is expected to minimize the potential for marine debris-related impacts. The IPFs with potential impacts listed in **Table 2** are discussed below.

#### **Impacts of Drilling Rig Presence, Marine Sound, and Lights**

Marine birds that frequent offshore oil and gas operations may be exposed to contaminants including air pollutants and routine discharges, but significant impacts are unlikely due to rapid dispersion. Birds migrating over water have been known to collide with offshore structures, resulting in injury and/or death (Wiese et al., 2001; Russell, 2005). Black-capped Petrels may be attracted to lights on the drilling rig, which could increase the risk of a collision.

Mortality of migrant birds at tall towers and other land-based structures has been reviewed extensively, and the mechanisms involved in offshore vessel collisions appear to be similar. In some cases, birds simply do not see a part of the structure until it is too late to avoid it. In other cases, navigation may be disrupted by marine sound (Russell, 2005). On the other hand, offshore structures are suitable stopover perches for most species (Russell, 2005). Due to the limited scope and short duration of drilling activities described in this EP and the low density of Black-capped Petrels in the Gulf of Mexico, no significant impacts are expected.

## Impacts of Support Vessel and Helicopter Traffic

Support vessels and helicopters are unlikely to significantly disturb Black-capped Petrels in open, offshore waters. Schwemmer et al. (2011) showed that several marine bird species showed behavioral responses and altered distribution patterns in response to ship traffic, which could potentially cause loss of foraging time and resting habitat. However, it is likely that individuals would experience, at most, only short-term behavioral disruption, and the impact would not be significant on Black-capped Petrels.

## Impacts of a Small Fuel Spill

Potential spill impacts on marine birds in general are discussed by BOEM (2017). For this EP, there are no unique site-specific issues with respect to spill impacts on Black-capped Petrels.

The probability of a fuel spill is expected to be minimized by bp's preventative measures during routine operations, including fuel transfer procedures. In the unlikely event of a spill, implementation of bp's ROSRP is expected to reduce the potential for impacts on Black-capped Petrels. EP Appendix G provides details on spill response measures. Given the open ocean location of the project area and the expected short duration of a small fuel spill, the potential exposure period for Black-capped Petrels would be brief.

A small fuel spill in offshore waters would produce a slick on the water surface and increase the concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that over 90% would be evaporated or dispersed naturally within 24 hours (NOAA, 2022). The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

Black-capped Petrels exposed to fuel on the sea surface could experience direct physical and physiological effects including skin irritation; chemical burns of skin, eyes, and mucous membranes; and inhalation of VOCs. Due to the limited areal extent and short duration of water quality impacts from a small fuel spill, secondary impacts due to ingestion of oil via contaminated prey or reductions in prey abundance are unlikely. Due to the low densities of Black-capped Petrels, the small area affected, and the brief duration of the surface slick, minimal if any impacts would be expected.

## Impacts of a Large Oil Spill

Potential spill impacts on marine and pelagic birds in general are discussed by BOEM (2017). For this EP, there are no unique site-specific issues with respect to spill impacts on Black-capped Petrels.

Black-capped Petrels could be exposed to oil from a spill at the project area; the number of individuals that could be affected in open, offshore waters would depend on the extent and persistence of the oil slick and the number of Black-capped Petrels in the area.

Following the *Deepwater Horizon* incident in 2010, no Black-capped Petrels were reported as oiled or recovered dead (USFWS, 2023b), but decomposition would likely have made positive identification difficult (Haney et al., 2014). Exposure of marine birds to oil can result in adverse health with severity, depending on the level of oiling. Effects can range from plumage damage

and loss of buoyancy from external oiling to more severe effects, such as organ damage, immune suppression, endocrine imbalance, reduced aerobic capacity, and death as a result of oil inhalation or ingestion (NOAA, 2018a). Other indirect impacts would also likely occur after a large oil spill, such as a reduction in suitable foraging habitat and the decline in population of prey species (USFWS, 2023b).

Overall, a large oil spill could cause significant impacts on Black-capped Petrel populations if there were numerous individuals in the area of the spill. However, due to the low number of individuals thought to frequent the northern Gulf of Mexico, significant impacts on this species from a large spill is considered unlikely.

### **C.3.9 Rufa Red Knot (Threatened)**

The Rufa Red Knot is a small to medium-sized migratory shorebird that transits each year between breeding grounds in Canada to wintering grounds in the southeast U.S., Caribbean, and along the Gulf of Mexico coast (USFWS, 2020). Listed as Threatened under the ESA in 2015, their primary habitat during the winter along the Gulf of Mexico is in the Laguna Madre estuary system in Mexico and Texas.

The primary threats that are faced by Rufa Red Knot include habitat loss, reduced food availability, and alterations of their migratory timing and patterns due to climate and weather conditions (USFWS, 2020). Precise population numbers are difficult to assess, but USFWS estimated in 2023 that the global population was approximately 42,000 individuals (The Wildlife Society, 2023). Critical habitat was proposed by USFWS in 2023 which includes numerous areas along the U.S. Gulf of Mexico coastline.

IPFs that potentially may affect the Rufa Red Knots include support vessel and helicopter traffic; and two types of accidents (a small fuel spill and a large oil spill). Drilling rig presence, marine sound, and lights, and effluent discharges are not expected to have a significant impact because this species typically is not found in offshore waters and instead is more coastal in nature. The IPFs with potential impacts listed in **Table 2** are discussed below.

#### **Impacts of Support Vessel and Helicopter Traffic**

Support vessels and helicopters are unlikely to significantly disturb Rufa Red Knots in offshore waters where they are not common or in nearshore industrial areas near the shorebase. Schwemmer et al. (2011) showed that several marine bird species showed behavioral responses and altered distribution patterns in response to ship traffic, which could potentially cause loss of foraging time and resting habitat. However, it is likely that individuals would experience, at most, only short-term behavioral disruption, and the impact would not be significant.

#### **Impacts of a Small Fuel Spill**

Potential spill impacts on coastal birds in general are discussed by BOEM (2017). For this EP, there are no unique site-specific issues with respect to spill impacts on Rufa Red Knots.

The probability of a fuel spill is expected to be minimized by bp's preventative measures during routine operations, including fuel transfer procedures. In the unlikely event of a spill, implementation of bp's ROSRP is expected to reduce the potential for impacts on Black-capped Petrels. EP Appendix G provides details on spill response measures. Given Rufa Red Knots are

mostly found in coastal areas and the expected short duration of a small fuel spill, the potential exposure period for Rufa Red Knots would be brief.

A small fuel spill in coastal waters would produce a slick on the water surface and increase the concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that over 90% would be evaporated or dispersed naturally within 24 hours (NOAA, 2022). The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

Rufa Red Knots exposed to fuel on the sea surface could experience direct physical and physiological effects including skin irritation; chemical burns of skin, eyes, and mucous membranes; and inhalation of VOCs. Due to the limited areal extent and short duration of water quality impacts from a small fuel spill, secondary impacts due to ingestion of oil via contaminated prey or reductions in prey abundance are unlikely. It is not expected that a small fuel spill would substantially affect Rufa Red Knot populations.

### **Impacts of a Large Oil Spill**

Potential spill impacts on coastal birds in general are discussed by BOEM (2017). For this EP, there are no unique site-specific issues with respect to spill impacts on Rufa Red Knots.

Rufa Red Knots could be exposed to oil from a spill at the project area that travels into coastal area; the number of individuals that could be affected would depend on the extent and persistence of the oil slick and the number of Rufa Red Knots in the area, which is largely seasonally based.

Following the *Deepwater Horizon* incident in 2010, only a single Rufa Red Knot was reported as oiled (USFWS, 2020), but decomposition would likely have made positive identification difficult (Haney et al., 2014). Exposure of marine and coastal birds to oil can result in adverse health with severity, depending on the level of oiling. Effects can range from plumage damage and loss of buoyancy from external oiling to more severe effects, such as organ damage, immune suppression, endocrine imbalance, reduced aerobic capacity, and death as a result of oil inhalation or ingestion (NOAA, 2018a). Other indirect impacts would also likely occur after a large oil spill, such as a reduction in suitable foraging habitat and the decline in population of prey species (USFWS, 2023b).

Overall, a large oil spill could cause significant impacts on Rufa Red Knot populations if there were numerous individuals in the area of the spill or in coastal areas that became oiled.

### **C.3.10 Oceanic Whitetip Shark (Threatened)**

The oceanic whitetip shark was listed as Threatened under the ESA on 30 January 2018 (effective 30 March 2018) by NMFS (83 FR 4153). Oceanic whitetip sharks are found worldwide in offshore waters between approximately 30° N and 35° S latitude, and historically were one of the most widespread and abundant species of shark (Rigby et al., 2019). However, based on reported oceanic whitetip shark catches in several major long-line fisheries, the global population appears to have suffered substantial declines (Camhi et al., 2008) and the species is now only occasionally reported in the Gulf of Mexico (Rigby et al., 2019).

Oceanic whitetip shark management is complicated due to it being globally distributed, highly migratory, and overlapping in areas of high fishing pressure; thus, leaving assessment of population trends on fishery dependent catch-and-effort data rather than scientific surveys (Young and Carlson, 2020). A comparison of historical shark catch rates in the Gulf of Mexico by Baum and Myers (2004) noted that most recent papers dismissed the oceanic whitetip shark as rare or absent in the Gulf of Mexico. NMFS (2023) noted that there has been an 88% decline in abundance of the species in the Gulf of Mexico since the mid-1990s due to commercial fishing pressure.

IPFs that could affect the oceanic whitetip shark include drilling rig presence, sound, and lights, and a large oil spill. Though NMFS (2020a) lists a small diesel fuel spill as an IPF, in the project area, a small diesel fuel spill would be unlikely to affect oceanic whitetip sharks due to rapid natural dispersion of diesel fuel and the low density of oceanic whitetip sharks potentially present in the project area. Therefore, no significant impacts are expected from small diesel fuel spills and they are not further discussed (**Table 2**).

### **Impacts of Drilling Rig Presence, Marine Sound, and Lights**

Offshore drilling activities produce a broad array of sound at frequencies and intensities that may be detected by sharks including the Threatened oceanic whitetip shark. The general frequency range for elasmobranch hearing is approximately between 20 Hz and 1 kHz (Ladich and Fay, 2013) which includes sensitivities for individual species to SPLs between approximately 134 to 148 dB re 1  $\mu$ Pa in nurse sharks (*Ginglymostoma cirratum*) at frequencies between 100 and 1,000 Hz (Casper and Mann, 2006). These frequencies overlap with sound associated with drilling activities (source levels of 195 dB re 1  $\mu$ Pa m with peak frequencies at 40 to 100 Hz) (Hildebrand, 2005). Impacts from offshore drilling activities (i.e., non-impulsive sound) could include masking or behavioral changes (Popper et al., 2014). However, because of the limited propagation distances of high SPLs from the drilling rig, impacts would be limited in geographic scope. It is anticipated that animals would move away from the static sound source and avoid auditory injury or disturbances. Therefore, no population level impacts on oceanic whitetip sharks are expected.

### **Impacts of a Large Oil Spill**

Information regarding the direct effects of oil on elasmobranchs, including the oceanic whitetip shark are largely unknown. However, in the event of a large oil spill, oceanic whitetip sharks could be affected by direct ingestion, ingestion of oiled prey, or the absorption of dissolved petroleum products through the gills. Because oceanic whitetip sharks may be found in surface waters, they could be more likely to be impacted by floating oil than other species which only reside at depth.

It is possible that a large oil spill could affect individual oceanic whitetip sharks and result in injuries or deaths. However, due to the low density of oceanic whitetip sharks thought to exist in the Gulf of Mexico, it is unlikely that a large spill would result in population level effects.

#### **C.3.11 Giant Manta Ray (Threatened)**

The giant manta ray is a Threatened elasmobranch species that is a slow-growing, migratory, planktivorous species that inhabits tropical, subtropical, and temperate bodies of water

worldwide (NOAA, 2018). The giant manta ray became listed as Threatened under the ESA in 2018.

Commercial fishing is the primary threat to giant manta rays (NOAA, 2023b). The species is targeted and caught as bycatch in several global fisheries throughout its range. Although protected in U.S. waters, protection of populations is difficult as they are highly migratory with sparsely distributed and fragmented populations throughout the world. Some estimated regional population sizes are small (between 100 to 1,500 individuals) (Marshall et al., 2018; NOAA, 2018). Stewart et al. (2018) recently reported that the Flower Garden Banks serves as nursery habitat for aggregations of juvenile manta rays. Approximately 100 unique individuals have been positively identified at the Flower Garden Banks based on unique underbelly coloration (Belter et al., 2020). Genetic and photographic evidence in the Flower Garden Banks over 25 years of monitoring showed that 95% of identified giant manta ray male individuals were smaller than mature size (Stewart et al., 2018).

IPFs that may impact giant manta rays include drilling rig presence, marine sound, and lights, and a large oil spill. Though NMFS (2020a) lists a small diesel fuel spill as an IPF, in the project area a small diesel fuel spill would be unlikely to affect giant manta rays due to rapid natural dispersion of diesel fuel and the low density of giant manta rays potentially present in the project area. Therefore, no significant impacts are expected from small diesel fuel spills and they are not further discussed (See **Table 2**).

### **Impacts of Drilling Rig Presence, Marine Sound, and Lights**

Offshore drilling activities produce a broad array of sound at frequencies and intensities that may be detected by elasmobranchs including the Threatened giant manta ray. The general frequency range for elasmobranch hearing is approximately between 20 Hz and 1 kHz (Ladich and Fay, 2013). Studies indicate sensitivities to SPLs between approximately 139 and 153 dB re 1  $\mu$ Pa in yellow stingray (*Urobatis jamaicensis*) and SPLs between approximately 120 and 145 dB re 1  $\mu$ Pa in little skate (*Erinacea raja*) at frequencies from 100 to 1,000 Hz (Casper et al., 2003; Casper and Mann, 2006). These frequencies overlap with sound associated with drilling activities (source levels of 195 dB re 1  $\mu$ Pa m with peak frequencies at 40 to 100 Hz) (Hildebrand, 2005). Impacts from offshore drilling activities (i.e., non-impulsive sound) could include masking or behavioral changes (Popper et al., 2014). However, because of the limited propagation distances of high SPLs from the drilling rig, impacts would be limited in geographic scope. It is anticipated that animals would move away from the static sound source and avoid auditory injury or disturbances. Therefore, no population level impacts on giant manta rays are expected.

### **Impacts of a Large Oil Spill**

A large oil spill in the project area could reach coral reefs at the Flower Garden Banks which is the only known location of giant manta ray aggregations in the Gulf of Mexico, although individuals may occur anywhere in the Gulf. In the unlikely event of a large oil spill impacting areas with giant manta rays, individual rays could be affected by direct ingestion of oil which could cover their gill filaments or gill rakers, or by ingestion of oiled plankton. Giant manta rays typically feed in shallow waters of less than 10 m (33 ft) depth (NOAA, 2018). Because of this shallow water feeding behavior, giant manta rays would be more likely to be impacted by floating oil than other species which most typically reside at depth.

In the event of a large oil spill, due to the distance between the project area and the Flower Garden Banks, it is unlikely that oil would impact the threatened giant manta ray nursery habitat. It is possible that a large oil spill could contact individual giant manta rays, but due to the low density of individuals thought to occur in the Gulf of Mexico, population-level impacts are not expected.

### **C.3.12 Gulf Sturgeon (Threatened)**

The Gulf sturgeon is a Threatened fish species that inhabits major rivers and inner shelf waters from the Mississippi River to the Suwannee River, Florida (Barkuloo, 1988; Wakeford, 2001). Sturgeon are anadromous fish that migrate from the ocean upstream into coastal rivers to spawn in freshwater.

The historic range of the species extended from the Mississippi River to Charlotte Harbor, Florida (Wakeford, 2001). This range has contracted to encompass major rivers and inner shelf waters from the Mississippi River to the Suwannee River, Florida. Populations have been depleted or even extirpated throughout this range by fishing, shoreline development, dam construction, water quality changes, and other factors (Barkuloo, 1988; Wakeford, 2001). These declines prompted the listing of the Gulf sturgeon as a Threatened species in 1991. The best-known populations occur in the Apalachicola and Suwannee Rivers in Florida (Carr, 1996; Sulak and Clugston, 1998), the Choctawhatchee River in Alabama (Fox et al., 2000), and the Pearl River in Mississippi/Louisiana (Morrow et al., 1998). Rudd et al. (2014) reconfirmed the spatial distribution and movement patterns of Gulf sturgeon by surgically implanting acoustic telemetry tags. Critical habitat in the Gulf extends from Lake Borgne, Louisiana (St. Bernard Parish), to Suwannee Sound, Florida (Levy County) (NMFS, 2022) (**Figure 2**). A species description is presented by BOEM (2012a) and in the recovery plan for this species (USFWS et al., 1995).

A large oil spill is the only IPF that potentially may affect Gulf sturgeon. There are no IPFs associated with routine project activities that could affect these fish. A small fuel spill in the project area would be unlikely to affect Gulf sturgeon because a small fuel spill would not be expected to make landfall or reach coastal waters prior to dissipating (see explanation in **Section A.9.1**). Vessel collisions to Gulf sturgeon would be unlikely based on the location of the support vessel base and NMFS (2020a) estimated one non-lethal Gulf sturgeon collision in the 50 years of proposed action.

#### **Impacts of a Large Oil Spill**

Potential spill impacts on Gulf sturgeon are discussed by NMFS (2007) and BOEM (2012a; 2017). For this EP, there are no unique site-specific issues with respect to this species.

The project area is approximately 234 statute miles (377 km) from the nearest Gulf sturgeon critical habitat. The 30-day OSRA modeling (**Table 4**) predicts that a spill in the project area has a <0.5% or less conditional probability of contacting any coastal areas containing Gulf sturgeon critical habitat within 30 days of a spill.

In the event of oil reaching Gulf sturgeon habitat, the fish could be affected by direct ingestion, ingestion of oiled prey, or the absorption of dissolved petroleum products through the gills. Based on the life history of this species, subadult and adult Gulf sturgeon would be most vulnerable to an estuarine or marine oil spill, and would be vulnerable from approximately

October through April when this species is foraging in estuarine and shallow marine habitats (NMFS, 2020a).

### **C.3.13 Nassau Grouper (Threatened)**

The Nassau grouper (*Epinephelus striatus*) is a Threatened, long-lived reef fish typically associated with hard bottom structures such as natural and artificial reefs, rocks, and underwater ledges (NOAA, 2024a). Once one of the most common reef fish species in the coastal waters of the United States and Caribbean (Sadovy, 1997), the Nassau grouper been subject to overfishing and is considered extinct in much of its historical range. Observations of current spawning aggregations compared with historical landings data suggest that the Nassau grouper population is substantially smaller than its historical size (NOAA, 2024a). The Nassau grouper was listed as Threatened under the ESA in 2016 (81 FR 42268).

Nassau groupers are found mainly in the shallow tropical and subtropical waters of eastern Florida, the Florida Keys, Bermuda, the Yucatán Peninsula, and the Caribbean, including the U.S. Virgin Islands and Puerto Rico within water depths up to 130 m (426 ft) (NOAA, 2024a). There has been one confirmed sighting of Nassau grouper from the Flower Garden Banks in the Gulf of Mexico at a water depth of 36 m (118 ft) (Foley et al., 2007). Three additional unconfirmed reports (i.e. lacking photographic evidence) of Nassau grouper have also been documented from mooring buoys and the coral cap region of the West Flower Garden flats (Foley et al., 2007).

There are no IPFs associated with routine project activities that could affect Nassau grouper. A small fuel spill would not affect Nassau grouper because the fuel would float and dissipate on the sea surface and would not be expected to reach the Flower Garden Banks or Florida Keys. A large hydrocarbon spill is the only relevant IPF.

## Impacts of a Large Oil Spill

A spill would be unlikely to contact the Flower Garden Banks based on the distance between the project area and the Flower Garden Banks (approximately 139 statute miles [224 km]), and the difference in water depth between the project area (1,247 to 1,284 m [4,092 to 4,211 ft]) and the Banks (approximately 17 to 145 m [56 to 476 ft]). While on the surface, hydrocarbons would not be expected to contact subsurface fish.

In the unlikely event that hydrocarbons contact Nassau grouper habitat, hydrocarbon droplets or contaminated sediment particles could come into contact with Nassau grouper present on the reefs. Individual fish could be affected by direct ingestion of hydrocarbons which could cover their gill filaments or gill rakers, result in ingestion of oiled prey, or the absorption of dissolved petroleum products through the gills.

### C.3.14 Smalltooth Sawfish (Endangered)

The smalltooth sawfish, named due to their flat, saw-like rostrum, is an elasmobranch ray which lives in shallow coastal tropical seas and estuaries where they feed on fish and invertebrates such as shrimp and crabs (NOAA Fisheries, 2023). Once found along most of the northern Gulf of Mexico coast from Texas to Florida, their current range in Gulf of Mexico is restricted to areas primarily in southwest Florida (Brame et al., 2019) where several areas of critical habitat have been designated (**Figure 2**). A species description is presented in the recovery plan for this species (NMFS, 2009b).

Listed as Endangered under the ESA in 2003, population numbers have drastically declined over the past century primarily due to accidental bycatch (Seitz and Poulakis, 2006). Although there are no reliable estimates for smalltooth sawfish population numbers throughout its range (NMFS, 2018b), data from 1989 to 2004 indicated a slight increasing trend in population numbers in Everglades National Park during that time period (Carlson et al., 2007). More recent data resulted in a similar conclusion, with indications that populations were stable or slightly increasing in southwest Florida (Carlson and Osborne, 2012).

There are no IPFs associated with routine project activities that could affect smalltooth sawfish. A small fuel spill would not affect smalltooth sawfish because the fuel would float and dissipate on the sea surface and would not be expected to reach smalltooth sawfish habitat in coastal areas (see **Section A.9.1**). A large oil spill is the only relevant IPF.

## Impacts of a Large Oil Spill

The project area is approximately 556 miles (895 km) from the nearest smalltooth sawfish critical habitat in Charlotte County, Florida. Based on the 30-day OSRA modeling (**Table 4**), coastal areas containing smalltooth sawfish critical habitat are unlikely to be affected within 30 days of a spill (<0.5% conditional probability).

Information regarding the direct effects of oil on elasmobranchs, including the smalltooth sawfish are largely unknown. A recent study by Cave and Kajiura (2018) reported that when exposed to crude oil, the Atlantic stingray (*Hypanus sabinus*) experienced impaired olfactory function which could lead to decreased fitness. In the event of oil reaching smalltooth sawfish habitats, the smalltooth sawfish could be affected by direct ingestion, ingestion of oiled prey, or the absorption of dissolved petroleum products through the gills as well as impaired olfactory function. Based on the shallow, coastal habitats preferred by smalltooth sawfish, individuals in

areas subject to coastal oiling could be more likely to be impacted than other species that reside at depth.

### **C.3.15 Beach Mice (Endangered)**

Four subspecies of Endangered beach mouse occur on the barrier islands of Alabama and the Florida Panhandle: the Alabama (*Peromyscus polionotus ammobates*), Choctawhatchee (*P. p. allophrys*), Perdido Key (*P. p. trissyllepsis*), and St. Andrew beach mouse (*P. p. peninsularis*). Critical habitat has been designated for all four subspecies and is shown combined in **Figure 2**. One additional subspecies of *Peromyscus* beach mouse inhabiting dunes on the western Florida Panhandle, the Santa Rosa beach mouse (*P. p. leucocephalus*), is not listed under the ESA. A large oil spill is the only IPF that potentially may affect beach mice. There are no IPFs associated with routine project activities that could affect these animals due to the distance from shore and the lack of any onshore support activities near their habitat. A small fuel spill in the project area would not affect beach mice because a small fuel spill would not be expected to reach beach mice habitat prior to dissipating (see **Section A.9.1**).

#### **Impacts of a Large Oil Spill**

Potential spill impacts on Endangered beach mice are discussed by BOEM (2017; 2023a,b). For this EP, there are no unique site-specific issues with respect to these species that were not analyzed in these documents.

Beach mouse critical habitat in Baldwin County, Alabama, is approximately 278 statute miles (447 km) from the project area. The 30-day OSRA modeling (**Table 4**) predicts that a spill in the project area has a <0.5% or less conditional probability of contacting any coastal areas containing beach mouse critical habitat within 30 days of a spill.

In the event of oil contacting these beaches, beach mice could experience several types of direct and indirect impacts. Contact with spilled oil could cause skin and eye irritation and subsequent infection; matting of fur; irritation of sweat glands, ear tissues, and throat tissues; disruption of sight and hearing; asphyxiation from inhalation of fumes; and toxicity from ingestion of oil and contaminated food. Indirect impacts could include reduction of food supply, destruction of habitat, and fouling of nests. Impacts could also occur from vehicular traffic and other activities associated with spill cleanup. However, any such impacts are unlikely due to the distance from shore and response actions that would occur in the event of a spill.

### **C.3.16 Florida Salt Marsh Vole (Endangered)**

The Florida salt marsh vole is a small, dark brown or black rodent found only in saltgrass (*Distichlis spicata*) meadows in the Big Bend region of Florida that was listed as Endangered under the ESA in 1991. Only two populations of Florida salt marsh vole are known to exist: one near Cedar Key in Levy County, Florida and one in the Lower Suwanee National Wildlife Refuge in Dixie County, Florida (Florida Fish and Wildlife Conservation Commission, nd-e). No critical habitat has been established for the Florida salt marsh vole in part due to concerns over illegal trapping or trespassing if the location of the populations were publicly disclosed (USFWS, 2001b).

A large oil spill is the only IPF that potentially may affect the Florida salt marsh vole. There are no IPFs associated with routine project activities that could affect these animals due to the

distance from the project area to their habitat and the lack of any onshore support activities near their habitat. A small fuel spill in the project area would not affect the Florida salt marsh vole because a small fuel spill would not be expected to reach their habitat prior to dissipating (see **Section A.9.1**).

### **Impacts of a Large Oil Spill**

Florida salt marsh vole habitat in Levy and Dixie counties, Florida is approximately 498 miles (801 km) from the project area. The 30-day OSRA modeling (**Table 4**) predicts that a spill in the project area has <0.5% or less conditional probability of contacting any coastal areas containing Florida salt marsh vole habitat within 30 days.

In the event of oil contacting beaches containing these animals, Florida salt marsh voles could experience several types of direct and indirect impacts. Contact with spilled oil could cause skin and eye irritation and subsequent infection; matting of fur; irritation of sweat glands, ear tissues, and throat tissues; disruption of sight and hearing; asphyxiation from inhalation of fumes; and toxicity from ingestion of oil and contaminated food. Indirect impacts could include reduction of food supply, destruction of habitat, and fouling of nests. Impacts could also occur from vehicular traffic and other activities associated with spill cleanup. Impacts associated with an extensive oiling of coastal habitat containing Florida salt marsh voles from a large oil spill are expected to be significant. Due to the extremely low population numbers, extensive oiling of Florida salt marsh vole habitat could result in the extinction of the species. However, any such impacts are unlikely due to the distance from the project area to Florida salt marsh vole habitat and response actions that would occur in the event of a spill.

### **C.3.17 Panama City Crayfish (Threatened)**

The USFWS issued a Final Rule designating the Panama City crayfish as Threatened under the ESA in 2022. The Panama City crayfish is a semi-terrestrial crayfish that grows up to 2 inches (51 mm) in size and is found in south-central Bay County, Florida. Medium to dark brown in color, the crayfish prefers areas dominated by herbaceous vegetation and shallow or fluctuating water levels (Keppner and Keppner, 2004). Historically prevalent in shallow freshwater bodies in pine and prairie communities, urban development has largely replaced these habitats. The Panama City crayfish is now generally found in wet or semi-wet swales, ditches, slash pine plantations, undeveloped utility rights-of-way, and remnant wetlands (Florida Fish and Wildlife Conservation Commission, 2016).

A large oil spill is the only IPF that potentially may affect the Panama City crayfish. There are no IPFs associated with routine project activities that could affect these animals due to the distance from the project area to their habitat and the lack of any onshore support activities near their habitat. A small fuel spill in the project area would not affect the Panama City crayfish because a small fuel spill would not be expected to reach their habitat prior to dissipating (see **Section A.9.1**).

### **Impacts of a Large Oil Spill**

Panama City crayfish critical habitat in Bay County, Florida is approximately 391 miles (629 km) from the project area. The 30-day OSRA modeling (**Table 4**) predicts that a spill in the project area has a <0.5% or less conditional probability of contacting any coastal areas containing Panama City crayfish critical habitat within 30 days.

Effects of oiling on the Panama City crayfish are largely unknown. In general, crayfishes use chemoreception to orient themselves in their environment, to find food, and to avoid predators (Bergman and Moore, 2005). Exposure to hydrocarbons has been shown to damage receptor cells that crayfish use for chemoreception, thus decreasing their fitness (Tierney et al., 2010).

Indirect impacts of oiling of Panama City crayfish habitat could include reduction of food supply, destruction of habitat, and fouling of burrows. Impacts could also occur from vehicular traffic and other activities associated with spill cleanup. Impacts associated with an extensive oiling of coastal habitat containing Panama City crayfish from a large oil spill are expected to be significant. Due to the low population numbers and restricted range, extensive oiling of Panama City crayfish habitat could be significant at the species level. However, any such impacts are unlikely due to the distance from the project area to Panama City crayfish habitat and response actions that would occur in the event of a spill.

### **C.3.18 Threatened Coral Species**

Seven Threatened coral species are known from the northern Gulf of Mexico: elkhorn coral, staghorn coral, lobed star coral, mountainous star coral, boulder star coral, pillar coral, and rough cactus coral. Elkhorn coral, lobed star coral, mountainous star coral, and boulder star coral have been reported from the coral cap region of the Flower Garden Banks (NOAA, 2014), but are unlikely to be present with a widespread distribution in the northern Gulf of Mexico because they typically inhabit coral reefs in shallow, clear tropical, or subtropical waters. Staghorn coral, pillar coral, and rough cactus coral are only known from the Florida Keys and Dry Tortugas (Florida Fish and Wildlife Conservation Commission, nd-d). Other Caribbean coral species evaluated by NMFS in 2014 (79 FR 53852) either do not meet the criteria for ESA listing or are not known from the Flower Garden Banks, Florida Keys, or Dry Tortugas.

NMFS has designated critical habitat for the boulder star coral, lobed star coral, mountainous star coral, pillar coral, and rough cactus coral in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea per 88 FR 54026 and became effective in September 2023. For the areas in the Gulf of Mexico, this includes the Flower Garden Banks and the waters near Miami-Dade and Monroe counties, Florida, and the Dry Tortugas (**Figure 2**).

There are no IPFs associated with routine project activities that could affect threatened corals in the northern Gulf of Mexico. A small fuel spill would not affect threatened coral species because the oil would float and dissipate on the sea surface. A large oil spill is the only relevant IPF.

#### **Impacts of a Large Oil Spill**

A spill would be unlikely to contact the corals of the Flower Garden Banks based on the distance between the project area and the Flower Garden Banks (approximately 139 statute miles [224 km]), and the difference in water depth between the project area (1,247 to 1,284 m [4,092 to 4,211 ft]) and the Banks (approximately 17 to 145 m [56 to 476 ft]). While on the surface, oil would not be expected to contact corals on the seafloor. Natural or chemical dispersion of oil could cause a subsurface plume which would have the remote possibility of contacting seafloor corals.

If a subsurface plume were to occur, impacts on the Flower Garden Banks would be unlikely due to the distance between the project area and corals within the Flower Garden Banks.

Near-bottom currents in the region are predicted to flow along the isobaths (Nowlin et al., 2001) and typically would not carry a plume upward onto the continental shelf. Valentine et al. (2014) observed the spatial distribution of excess hopane, a crude oil tracer from *Deepwater Horizon* spill sediment core samples, to be in the deeper waters and not transported up the shelf, thus confirming that near-bottom currents flow along the isobaths.

In the unlikely event that a subsurface plume reached reefs at the Flower Garden Banks or other Gulf of Mexico reefs, oil droplets or oiled sediment particles could come into contact with reef organisms or corals. As discussed by BOEM (2017), impacts relevant to these corals could include loss of habitat, biodiversity, and live coral coverage. Sub-lethal effects could be long-lasting and affect the resilience of coral colonies to natural disturbances (e.g., elevated water temperature and diseases) (BOEM, 2017).

Due to the distance between the project area and coral habitats, there is a low chance of oil contacting Threatened coral critical habitat in the event of a spill, and no significant impacts on threatened coral species are expected.

### **C.3.19 Queen Conch (Threatened)**

The Queen conch is a large gastropod that occurs throughout the Caribbean Sea, Gulf of Mexico, and Bermuda which was listed as Threatened under the ESA in 2024 (NOAA, 2024b). The species is slow moving and found in a variety of habitats including seagrass beds, sands flats, algal beds, and rubble areas up to 30 meters in water depth. Larval conch feed primarily on phytoplankton, while juvenile and adults feed on a mix of seagrass and macroalgae (Stoner and Appeldoorn, 2022). Overall, the population of Queen conch is declining, largely due to overfishing and illegal fishing practices. Exact population numbers are unknown due to the difficulty in obtaining accurate counts. The majority of available density estimates suggest that conch populations are below minimum thresholds necessary to maintain or increase populations (Horn et al., 2022).

There are no IPFs associated with routine project activities that could affect Queen conch. A small fuel spill would not affect Queen conch because the fuel would float and dissipate on the sea surface. A large oil spill is the only relevant IPF.

#### **Impacts of a Large Oil Spill**

A large oil spill in the project area could potentially reach Queen conch habitat and affect the substrate. These effects would be of particular concern where the species occurs in shallower waters. There is some information available on the effects of oil spills on seagrass meadows and other marine gastropods, but little information available on the direct effects of oil on Queen conch (Horn et al., 2022). In the event of a large oil spill, due to the low density of individual Queen conch thought to occur in the Gulf of Mexico, any population-level impacts are considered unlikely.

## **C.4 Coastal and Marine Birds**

### **C.4.1 Marine Birds**

Marine birds include seabirds and other species that may occur in the pelagic environment of the project area (Clapp et al., 1982a; Clapp et al., 1982b; 1983; Davis and Fargion, 1996; Davis et al., 2000). Seabirds spend much of their lives offshore over the open ocean, except during breeding season when they nest along the coast (on the mainland and on barrier islands).

In addition, other birds such as waterfowl, marsh birds, and shorebirds may occasionally be present over open ocean areas. No Endangered or Threatened bird species are likely to occur at the project area due to the distance from shore. For a discussion of shorebirds and coastal nesting birds, see **Section C.4.2**.

Seabirds of the northern Gulf of Mexico were surveyed from ships during the GulfCet II program (Davis et al., 2000) which reported that terns, storm-petrels, shearwaters, and jaegers were the most frequently sighted seabirds in deepwater areas of the Gulf of Mexico. From these surveys, four ecological categories of seabirds were documented in the deepwater areas of the Gulf: summer migrants (shearwaters, storm petrels, boobies); summer residents that breed in the Gulf (Sooty Tern [*Onychoprion fuscatus*], Least Tern [*Sternula antillarum*], Sandwich Tern [*Thalasseus sandvicensis*], Magnificent Frigatebird [*Fregata magnificens*]); winter residents (gannets, gulls, jaegers); and permanent resident species (Laughing Gulls [*Leucophaeus atricilla*], Royal Terns [*Thalasseus maximus*], Bridled Terns [*Onychoprion anaethetus*]) (Davis et al., 2000).

Common marine bird species include Wilson's Storm-Petrel (*Oceanites oceanicus*), Magnificent Frigatebird, Northern Gannet (*Morus bassanus*), Masked Booby (*Sula dactylatra*), Brown Booby (*Sula leucogaster*), Cory's Shearwater (*Calonectris borealis*), Greater Shearwater (*Puffinus gravis*), and Audubon's Shearwater (*Puffinus lherminieri*). Seabirds are distributed Gulf-wide and are not specifically associated with the project area.

Relationships with hydrographic features were found for several marine bird species, possibly due to effects of hydrography on nutrient levels and productivity of surface waters where birds forage. The GulfCet II study did not estimate bird densities; however, Haney et al. (2014) indicated that marine bird densities over the open ocean were estimated to be 1.6 birds km<sup>-2</sup>.

IPFs that potentially may affect marine birds include drilling rig presence, marine sound, lighting, support vessel and helicopter traffic; and two types of accidents (a small fuel spill and a large oil spill). Effluent discharges permitted under the NPDES are likely to have negligible impacts on the birds due to rapid dispersion, the small area of ocean affected, the intermittent nature of the discharges, and the mobility of these animals. Compliance with NTL BSEE-2015-G03 is expected to minimize the potential for marine debris-related impacts on birds. The IPFs with potential impacts listed in **Table 2** are discussed below.

### **Impacts of Drilling Rig Presence, Marine Sound, and Lights**

Marine birds that frequent offshore oil and gas operations may be exposed to contaminants including air pollutants and routine discharges, but significant impacts are unlikely due to rapid dispersion. Birds migrating over water have been known to collide with offshore structures, resulting in injury and/or death (Wiese et al., 2001; Russell, 2005). Mortality of migrant birds at tall towers and other land-based structures has been reviewed extensively, and the mechanisms involved in rig collisions appear to be similar. In some cases, migrants simply do not see a part of the rig until it is too late to avoid it. In other cases, navigation may be disrupted by marine sound (Russell, 2005). On the other hand, offshore structures are suitable stopover perches for most trans-Gulf migrant species, and most of the migrants that stop over on rigs probably benefit from their stay, particularly in spring (Russell, 2005). Due to the limited scope and short duration of activities described in this EP, any impacts on populations of either seabirds or trans-Gulf migrant birds are not expected to be significant.

Trans-Gulf migrant birds including shorebirds, wading birds, and terrestrial birds may also be present in the project area. Migrant birds may use offshore structures, including platforms and semisubmersibles for resting, feeding, or as temporary shelter from inclement weather (Russell, 2005). Some birds may be attracted to offshore structures because of the lights and the fish populations that aggregate around these structures. A study in the North Sea indicated that rig lighting causes circling behavior in various birds, especially on cloudy nights; apparently the birds' geomagnetic compass is upset by the red part of the spectrum from the lights currently in use (Van de Laar, 2007; Poot et al., 2008). The numbers varied greatly, from none to some tens of thousands of birds per night per rig, with an apparent effect radius of up to 3 miles (5 km) (Poot et al., 2008). A study in the Gulf of Mexico also noted the phenomenon but did not recommend mitigation (Russell, 2005). One factor to consider in evaluating this impact in the Gulf of Mexico would include the lower incidence of cloudy and foggy days in the Gulf of Mexico versus the North Sea. In laboratory experiments, Poot et al. (2008) found the magnetic compass of migratory birds to be wavelength dependent. Migratory birds require light from the blue-green part of the spectrum for magnetic compass orientation, whereas red light (visible long-wavelength) disrupts their magnetic orientation. They designed a field study to test if and how changing light color influenced migrating birds under field conditions. During field studies they found that nocturnally migrating birds were disoriented and attracted by red and white light (containing visible long-wavelength radiation), whereas they were clearly less disoriented by blue and green light (containing less or no visible long-wavelength radiation) (Poot et al., 2008).

Overall, potential negative impacts to birds from drilling rig lighting, sound, collisions, or other adverse effects are highly localized and may affect individual birds during migration periods. Sound generated from the drilling rig is not expected to impact marine birds. Therefore, these potential impacts are not expected to affect marine birds at the population or species level and are not significant.

### **Impacts of Support Vessel and Helicopter Traffic**

Support vessels and helicopters are unlikely to significantly disturb marine birds in open, offshore waters. Schwemmer et al. (2011) showed that several marine bird species showed behavioral responses and altered distribution patterns in response to ship traffic, which could potentially cause loss of foraging time and resting habitat. However, it is likely that individual birds would experience, at most, only short-term behavioral disruption, and the impact would not be significant.

### **Impacts of a Small Fuel Spill**

Potential spill impacts on marine birds are discussed by BOEM (2017). For this EP, there are no unique site-specific issues with respect to spill impacts on these animals.

The probability of a fuel spill is expected to be minimized by bp's preventative measures during routine operations, including fuel transfer procedures. In the unlikely event of a spill, implementation of bp's ROSRP is expected to reduce the potential for impacts on marine birds. EP Appendix G provides detail on spill response measures. Given the open ocean location of the project area and the expected short duration of a small fuel spill, the potential exposure period for marine birds would be brief.

A small fuel spill in offshore waters would produce a slick on the water surface and increase the concentrations of petroleum hydrocarbons and their degradation products. The extent and

persistence of impacts would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that over 90% would be evaporated or dispersed naturally within 24 hours (NOAA, 2022). The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

Marine birds exposed to oil on the sea surface could experience direct physical and physiological effects including skin irritation; chemical burns of skin, eyes, and mucous membranes; and inhalation of VOCs. Due to the limited areal extent and short duration of water quality impacts from a small fuel spill, secondary impacts due to ingestion of oil via contaminated prey or reductions in prey abundance are unlikely. Due to the low densities of birds in open ocean areas, the small area affected, and the brief duration of the surface slick, minimal if any impacts on pelagic birds would be expected.

### **Impacts of a Large Oil Spill**

Potential spill impacts on marine and pelagic birds are discussed by BOEM (2017). For this EP, there are no unique site-specific issues with respect to spill impacts on these animals.

Pelagic seabirds could be exposed to oil from a spill at the project area. Davis et al. (2000) reported that terns, storm-petrels, shearwaters, and jaegers were the most frequently sighted seabirds in the deepwater Gulf of Mexico (>200 m). Haney et al. (2014) estimated that seabird densities over the open ocean were approximately 1.6 birds km<sup>-2</sup>. The number of pelagic birds that could be affected in open, offshore waters would depend on the extent and persistence of the oil slick.

Data following the *Deepwater Horizon* incident provide relevant information about the species of pelagic birds that may be affected in the event of a large oil spill. Birds that were treated for oiling include several pelagic species such as the Northern Gannet, Magnificent Frigatebird, and Masked Booby. The Northern Gannet is among the species with the largest numbers of birds affected by the spill. Exposure of marine birds to oil can result in adverse health with severity, depending on the level of oiling. Effects can range from plumage damage and loss of buoyancy from external oiling to more severe effects, such as organ damage, immune suppression, endocrine imbalance, reduced aerobic capacity, and death as a result of oil inhalation or ingestion (NOAA, 2016).

### **C.4.2 Coastal Birds**

Threatened and Endangered bird species (Piping Plover and Whooping Crane) have been discussed previously in **Sections C.3.6** and **C.3.7**. The western Gulf of Mexico (in the US Exclusive Economic Zone [EEZ] from Texas to Mississippi) is a known wintering area for the Threatened Rufa Red Knot (*Calidris canutus rufa*) (USFWS, nd). Various species of non-endangered birds are also found along the northern Gulf Coast, including diving birds, shorebirds, marsh birds, wading birds, and waterfowl. Gulf Coast marshes and beaches also provide important feeding and nesting habitats. Species that nest on beaches, flats, dunes, bars, barrier islands, and similar coastal and nearshore habitats include the Sandwich Tern (*Thalasseus sandvicensis*), Wilson's Plover (*Charadrius wilsonia*), Black Skimmer (*Rynchops niger*), Forster's Tern (*Sterna forsteri*), Gull-Billed Tern (*Gelochelidon nilotica*), Laughing Gull, Least Tern, and Royal Tern. Additional information is presented by BOEM (2017).

The Eastern Brown Pelican was delisted from federal Endangered status in 2009 (USFWS, 2016b) and was delisted from state species of special concern status by the State of Florida in 2017 (Florida Fish and Wildlife Conservation Commission, 2021) and Louisiana (Louisiana Wildlife and Fisheries, 2020). However, this species remains listed as endangered by the state of Mississippi (Mississippi Natural Heritage Program, 2018). Brown Pelicans inhabit coastal habitats and forage within both coastal waters and waters of the inner continental shelf. Aerial and shipboard surveys, including GulfCet and GulfCet II, indicate that Brown Pelicans do not occur in deep offshore waters (Fritts and Reynolds, 1981; Davis and Fargion, 1996; Davis et al., 2000).

The Bald Eagle was delisted from its Threatened status in the lower 48 states on 28 June 2007, but still receives protection under the Migratory Bird Treaty Act of 1918 and the Bald and Golden Eagle Protection Act of 1940. The Bald Eagle is a terrestrial raptor widely distributed across the southern U.S., including coastal habitats along the Gulf of Mexico. The Gulf Coast is inhabited by both wintering migrant and resident Bald Eagles (Johnsgard, 1990; Ehrlich et al., 1992).

IPFs that potentially may affect shorebirds and coastal nesting birds include support vessel and helicopter traffic and a large oil spill. A small fuel spill in the project area would be unlikely to affect shorebirds or coastal nesting birds, as the project area is 116 statute miles (187 km) from the nearest shoreline. As explained in **Section A.9.1**, a small fuel spill would not be expected to make landfall or reach coastal waters prior to dissipating. Compliance with NTL BSEE-2015-G03 is expected to minimize the potential for marine debris-related impacts on shorebirds.

### **Impacts of Support Vessel and Helicopter Traffic**

Support vessels and helicopters will transit coastal areas near Port Fourchon and Houma, Louisiana, where shorebirds and coastal nesting birds may be found. These activities could periodically disturb individuals or groups of birds within coastal habitats (e.g., wetlands that may support feeding, resting, or breeding birds).

Vessel traffic may disturb some foraging and resting birds with flushing distances varying among species and among individuals (Rodgers and Schwikert, 2002; Schwemmer et al., 2011; Mendel et al., 2019). The disturbances will be limited to flushing birds away from vessel pathways; known distances are from 20 to 49 m (65 to 160 ft) for personal watercrafts and 23 to 58 m (75 to 190 ft) for outboard-powered boats (Rodgers and Schwikert, 2002). Support vessels will not approach nesting or breeding areas on the shoreline, so disturbances to nesting birds, eggs, and chicks is not expected. Vessel operators are expected to use designated navigation channels and comply with posted speed and wake restrictions while transiting sensitive inland waterways. Due to the limited scope and short duration of drilling activities, any short-term impacts are not expected to be significant to coastal bird populations.

Helicopter traffic can cause some disturbance to birds onshore and offshore. Responses are highly dependent on the type of aircraft, the bird species, the activities that the animals were previously engaged in, and previous exposures to overflights (Efroymsen et al., 2003). Helicopters seem to cause the most intense responses over other human disturbances (Bélanger and Bédard, 1989; Rojek et al., 2008; Fuller et al., 2018). The Federal Aviation Administration recommends (Advisory Circular No. 91-36D) that pilots maintain a minimum altitude of 610 m (2,000 ft) when flying over sound-sensitive areas such as parks, forest, primitive areas, wilderness areas, National Seashores, or National Wildlife Refuges, and maintain

flight paths to reduce aircraft marine sound in these marine sound-sensitive areas. The 2,000-foot altitude minimum is greater than the distance (slant range) at which aircraft overflights have been reported to cause behavioral effects on most species of birds studied by Efroymson et al. (2000). It is assumed that adherence to these guidelines would reduce potential behavioral disturbances (such as temporary displacement or avoidance behavior) of individual birds in coastal and inshore areas. The potential impacts from helicopter traffic are not expected to be significant to coastal bird populations or species in the project area.

### Impacts of Large Oil Spill

The 30-day OSRA results summarized in **Table 4** estimate that shorelines in Texas and Louisiana could be contacted within 30 days (1% to 4% conditional probability).

Coastal birds can be exposed to oil as they float on the water surface, dive during foraging, or wade in oiled coastal waters. Oil interferes with the water repellency of feathers and can cause hypothermia in the right conditions. As birds groom themselves, they can ingest and inhale the oil on their bodies. Scavengers such as Bald Eagles and gulls can be exposed to oil by feeding on carcasses of contaminated fish and wildlife. While ingestion can kill animals immediately, more often it results in lung, liver, and kidney damage, which can lead to death (BOEM, 2017). Bird eggs may be damaged if an oiled adult sits on the nest.

Brown and White Pelicans (*Pelecanus erythrorhynchos*) are especially at risk from direct and indirect impacts from spilled oil within inner shelf and inshore waters, such as embayments. The range of these species is generally limited to these waters and surrounding coastal habitats. Brown Pelicans feed on mid-sized fish that they capture by diving from above (“plunge diving”) and then scooping the fish into their expandable gular pouch, while White Pelicans feed from the surface by dipping their beaks in the water. These behaviors make pelicans susceptible to plumage oiling if they feed in areas with surface oil or an oil sheen. They may also capture prey that has been physically contaminated with oil or has ingested oil. Issues for Brown and White Pelicans include direct contact with oil, disturbance by cleanup activities, and long-term habitat contamination (BOEM, 2017).

Coastal fishing birds of prey such as bald eagles, ospreys (*Pandon haliaetus*), etc. may also be at risk from direct and indirect impacts from spilled oil. This species often captures fish within shallow water areas (snatching prey from the surface or wading into shallow areas to capture prey with their bill) and so may be susceptible to plumage oiling and, as with the Brown and White Pelicans, they may also capture prey that has been physically contaminated with oil or has ingested oil (BOEM, 2017). It is expected that impacts to coastal birds from a large oil spill resulting in the death of individual birds would be adverse but not significant at population levels.

## C.5 Fisheries Resources

### C.5.1 Pelagic Communities and Ichthyoplankton

Biggs and Ressler (2000) reviewed the biology of pelagic communities in the deepwater environment of the northern Gulf of Mexico. The biological oceanography of the region is dominated by the influence of the Loop Current, whose surface waters are among the most oligotrophic in the world's oceans. Superimposed on this low-productivity condition is productive "hot spots" associated with entrainment of nutrient-rich Mississippi River water and mesoscale oceanographic features. Anticyclonic and cyclonic hydrographic features play an important role in determining biogeographic patterns and controlling primary productivity in the northern Gulf of Mexico (Biggs and Ressler, 2000).

Most fishes inhabiting shelf or oceanic waters of the Gulf of Mexico have planktonic eggs and larvae (Ditty, 1986; Ditty et al., 1988; Richards et al., 1989; Richards et al., 1993). A study by Ross et al. (2012) on midwater fauna to characterize vertical distribution of mesopelagic fishes in selected deepwater areas in the Gulf of Mexico substantiated high species richness but general domination by relatively few families and species.

IPFs that potentially may affect pelagic communities and ichthyoplankton include drilling rig presence, marine sound, and lights; effluent discharges; water intake; and two types of accidents (a small fuel spill and a large oil spill). These IPFs with potential impacts listed in **Table 2** are discussed below.

#### Impacts of Drilling Rig Presence, Marine Sound, and Lights

The drilling rig, as a floating structure in the deepwater environment, will act as fish aggregating devices (FADs). In oceanic waters, the FAD effect would be most pronounced for epipelagic fishes such as tunas, dolphin, billfishes, and jacks, which are commonly attracted to fixed and drifting surface structures (Holland, 1990; Higashi, 1994; Relini et al., 1994). Positive fish associations with offshore rigs and platforms in the Gulf of Mexico are well documented (Gallaway and Lewbel, 1982; Wilson et al., 2003; 2006; Edwards and Sulak, 2006). The FAD effect could possibly enhance the feeding of epipelagic predators by attracting and concentrating smaller fish species. Drilling rig sound could potentially cause masking in fishes, thereby reducing their ability to hear biologically relevant sounds (Radford et al., 2014). The only defined acoustic threshold levels for non-impulsive sound are given by Popper et al. (2014) and apply only to species of fish with swim bladders that provide some hearing (pressure detection) function. Popper et al. (2014) estimated an SPL threshold level of 170 dB re 1  $\mu$ Pa over a 48-hour period for onset of recoverable injury and 158 dB re 1  $\mu$ Pa over a 12-hour period for onset temporary auditory threshold shifts. However, no consistent behavioral thresholds for fish resulting from non-impulsive sound have been established (Hawkins and Popper, 2014) and the current recommended behavioral threshold for fish is SPL of 150 dB re 1  $\mu$ Pa defined by the Fisheries Hydroacoustic Working Group (2008) for impulsive sound sources. Sound may also influence fish behaviors, such as predator-avoidance, foraging, reproduction, and intraspecific interactions (Picciulin et al., 2010; Bruintjes and Radford, 2013; McLaughlin and Kunc, 2015). Fish aggregation is likely to occur to some degree due to the presence of the drilling rig and, but the impacts would be limited in geographic scope and no population level impacts are expected.

Few data exist regarding the impacts of sound on pelagic larvae and eggs. Generally, it is believed that larval fish will have similar hearing sensitivities as adults, but may be more susceptible to barotrauma injuries associated with impulsive sound (Popper et al., 2014). Larval fish were experimentally exposed to simulated impulsive sounds by Bolle et al. (2012). The controlled playbacks produced SEL<sub>24h</sub> of 206 dB re 1  $\mu\text{Pa}^2 \text{ s}$  but resulted in no increased mortality between the exposure and control groups. Non-impulsive sound sources (such as drilling rig operations) are expected to be far less injurious than impulsive sound. Because of the periodic and transient nature of ichthyoplankton, they are not expected to remain in proximity to the source for a full 24-hour period to receive above-threshold sound, and no impacts to these life stages are expected.

### **Impacts of Effluent Discharges**

Muds and cuttings discharges may have a slight effect on the benthic environment near the wellsite, including a localized increase in water turbidity, the limited blanketing of seafloor sediments, and slightly increased concentrations of hydrocarbons and metals. Treated cuttings are monitored for visible sheen prior to discharge. Contaminants released into the water column will be diluted rapidly within the open ocean environment. Minimal impacts on pelagic communities are anticipated.

Treated sanitary and domestic wastes may have a slight effect on the pelagic environment in the immediate vicinity of these discharges. These wastes may have elevated levels of nutrients, organic matter, and chlorine, but should be diluted rapidly to undetectable levels within tens to hundreds of meters from the source. Minimal impacts on water quality, plankton, and nekton are anticipated.

Deck drainage may have a slight effect on the pelagic environment in the immediate vicinity of these discharges. Deck drainage from contaminated areas will be passed through an oil-and-water separator prior to release, and discharges will be monitored for visible sheen. The discharges may have slightly elevated levels of hydrocarbons but should be diluted rapidly to undetectable levels within tens to hundreds of meters from the source. Minimal impacts on water quality, plankton, and nekton are anticipated.

Other discharges in accordance with the NPDES permit, such as desalination unit brine and uncontaminated cooling water, fire water, and ballast water, are expected to be diluted rapidly and have little or no impact on pelagic communities.

### **Impacts of Water Intake**

Seawater will be drawn from the ocean for once-through, non-contact cooling of machinery on the drilling rig. The intake of seawater for cooling water will entrain plankton though per the NPDES permit GMG290000 the linear velocities should be less than 5 ft second<sup>-1</sup>. The low intake velocity should allow most strong-swimming juvenile fishes and smaller adults to escape entrainment or impingement (Electric Power Research Institute, 2000). However, drifting plankton would not be able to escape entrainment with the exception of a few fast-swimming larvae of certain taxonomic groups. Those organisms entrained may be stressed or killed (Cada, 1990; Mayhew et al., 2000), primarily through changes in water temperature during the route from cooling intake structure to discharge structure and mechanical damage (turbulence in pumps and condensers). The cooling water systems and operating procedures are designed such that a maximum return temperature of the seawater being discharged back into the ocean does

not exceed 120°F; thus, minimizing the chance that plankton will be stressed/killed. Due to the limited scope and short duration of drilling activities, any short-term impacts of entrainment are not expected to be significant to plankton or ichthyoplankton populations (BOEM, 2017). The drilling rig ultimately chosen for this project is expected to be in compliance with all cooling water intake requirements including NPDES permit GMG290000.

### **Impacts of a Small Fuel Spill**

Potential spill impacts on fisheries resources are discussed by BOEM (2017). For this EP, there are no unique site-specific issues with respect to spill impacts.

The probability of a fuel spill is expected to be minimized by bp's preventative measures during routine operations, including fuel transfer procedures. In the unlikely event of a spill, implementation of bp's ROSRP is expected to mitigate the potential for impacts on pelagic communities, including ichthyoplankton. EP Appendix G provides detail on spill response measures. Given the open ocean location of the project area, the duration of a small spill will be brief and the potential for impacts to occur would be minimal.

A small fuel spill in offshore waters would produce a slick on the water surface and increase the concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the release and the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that over 90% would dissipate naturally within 24 hours (NOAA, 2022). The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

A small fuel spill could have localized impacts on phytoplankton, zooplankton, and nekton. Determining the impact of a diesel spill on phytoplankton is a complex issue as some phytoplankton species are more tolerant of oil exposure than others (Ozhan et al., 2014). Phytoplankton populations can change quickly on small temporal and spatial scales, making it difficult to predict how a phytoplankton community as a whole will respond to an oil spill. Due to the limited areal extent and short duration of water quality impacts, a small fuel spill would be unlikely to produce detectable impacts on pelagic communities and ichthyoplankton.

### **Impacts of a Large Oil Spill**

Potential spill impacts on pelagic communities and ichthyoplankton are discussed by BOEM (2017). A large oil spill could affect water column biota including phytoplankton, zooplankton, ichthyoplankton, and nekton. A large spill that persisted for weeks or months would be more likely to affect these communities. While adult and juvenile fishes may actively avoid a large spill, planktonic eggs and larvae would be unable to avoid contact. Eggs and larvae of fishes are especially vulnerable to oiling because they inhabit the upper layers of the water column, and they will die if exposed to certain toxic fractions of spilled oil. Impacts potentially would be greater if local-scale currents retained planktonic larval assemblages (and the floating oil slick) within the same water mass. Impacts to ichthyoplankton from a large spill would be greatest during spring and summer when shelf concentrations peak (BOEM, 2016b).

Oil spill impacts to phytoplankton include changes in community structure and increases in biomass, which have been attributed to the effects of oil contamination and of decreased predation due to zooplankton mortality (Abbriano et al., 2011; Ozhan et al., 2014). Ozhan et al.

(2014) reported that the formation of oil films on the water surface can limit gas exchange through the air-sea interface and can reduce light penetration into the water column which will limit phytoplankton photosynthesis.

Mortality of zooplankton has been shown to be positively correlated with oil concentrations (Lennuk et al., 2015). Spills that are not immediately lethal can have short- or long-term impacts on biomass and community composition, behavior, reproduction, feeding, growth and development, immune response and respiration (Harvell et al., 1999; Wootton et al., 2003; Auffret et al., 2004; Hannam et al., 2010; Bellas et al., 2013; Blackburn et al., 2014). Zooplankton are especially vulnerable to acute oil pollution, showing increased mortality and sublethal changes in physiological activities (e.g., egg production; Moore and Dwyer, 1974; Linden, 1976; Lee et al., 1978; Suchanek, 1993). Bioaccumulation of hydrocarbons can lead to additional impacts among those higher trophic level consumers that rely on zooplankton as a food source (Almeda et al., 2013; Blackburn et al., 2014).

Planktonic communities have a high capacity for recovery from the effects of oil spill pollution due to their short life cycle and high reproductive capacity (Abbriano et al., 2011). Planktonic communities drift with water currents and recolonize from adjacent areas. Because of these attributes, plankton usually recover relatively rapidly to normal population levels following hydrocarbon spill events. Research in the aftermath of the *Deepwater Horizon* incident found that phytoplankton population recovered within weeks to months and zooplankton populations may have only been minimally affected (Abbriano et al., 2011).

## C.5.2 Essential Fish Habitat

Essential Fish Habitat (EFH) is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. Under the Magnuson-Stevens Fishery Conservation and Management Act, as amended, federal agencies are required to consult on activities that may adversely affect EFH designated in Fishery Management Plans developed by the regional Fishery Management Councils.

The Gulf of Mexico Fishery Management Council (GMFMC) has prepared Fishery Management Plans for corals and coral reefs, shrimps, spiny lobster (*Panulirus argus*), reef fishes, coastal migratory pelagic fishes, and red drum (*Sciaenops ocellatus*). In 2005, the EFH for these managed species was redefined in Generic Amendment No. 3 to the various Fishery Management Plans (GMFMC, 2005). The EFH for most of these GMFMC-managed species is on the continental shelf in waters shallower than 183 m (600 ft). The shelf edge is the outer boundary for coastal migratory pelagic fishes, reef fishes, and shrimps. EFH for corals and coral reefs includes some shelf-edge topographic features on the Texas-Louisiana OCS located approximately 30 statute miles (48 km) from the project area (**Figure 2**).

Highly migratory pelagic fishes, which occur as transients in the project area, are the only remaining group for which EFH has been identified in the deepwater Gulf of Mexico. Species in this group, including tunas, swordfishes, billfishes, and sharks, are managed by NMFS. **Table 7** lists the highly migratory fish species and their life stages with EFH at or near the project area.

Research indicates the central and western Gulf of Mexico may be important spawning habitat for Atlantic bluefin tuna (*Thunnus thynnus*), and (NMFS, 2009c) has designated a Habitat Area of Particular Concern (HAPC) for this species. The HAPC covers much of the deepwater Gulf of Mexico, including the project area (**Figure 2**). The areal extent of the HAPC is approximately

300,000 km<sup>2</sup> (115,831 mi<sup>2</sup>). Atlantic bluefin tuna follow an annual cycle of foraging in June through March off the eastern U.S. and Canadian coasts, followed by migration to the Gulf of Mexico to spawn in April, May, and June (NMFS, 2009c). The Atlantic bluefin tuna has also been designated as a species of concern (NMFS, 2011). An amendment to the original EFH Generic Amendment was finalized in 2005 (GMFMC, 2005). One of the most significant proposed changes in this amendment reduced the extent of EFH relative to the 1998 Generic Amendment by removing the EFH description and identification from waters between 100 fathoms and the seaward limit of the EEZ. The Highly Migratory Species Fisheries Management Plan was amended in 2009 to update EFH and HAPC to include the bluefin tuna spawning area (NMFS, 2009c).

Table 7. Migratory fish species with designated Essential Fish Habitat (EFH) at or near Green Canyon Block 584, including life stage(s) potentially present within the project area.

Common Name	Scientific Name	Life Stage(s) Potentially Present Within or Near the Project Area
Atlantic bluefin tuna	<i>Thunnus thynnus</i>	Spawning, eggs, larvae, adults
Bigeye tuna	<i>Thunnus obesus</i>	Juveniles, adults
Bigeye thresher shark	<i>Alopias superciliosus</i>	All
Blue marlin	<i>Makaira nigricans</i>	Juveniles, adults
Longbill spearfish	<i>Tetrapturus pfluegeri</i>	Juveniles, adults
Longfin mako shark	<i>Isurus paucus</i>	All
Oceanic whitetip shark	<i>Carcharhinus longimanus</i>	All
Sailfish	<i>Istiophorus</i> spp.	Juveniles, adults
Shortfin Mako	<i>Isurus oxyrinchus</i>	All
Silky shark	<i>Carcharhinus falciformis</i>	All
Skipjack tuna	<i>Katsuwonus pelamis</i>	Spawning, adults
Swordfish	<i>Xiphias gladius</i>	Larvae, juveniles, adults
Tiger Shark	<i>Galeocerdo cuvier</i>	Adults
Whale shark	<i>Rhincodon typus</i>	All
White marlin	<i>Tetrapturus albidus</i>	Juveniles, adults
Yellowfin tuna	<i>Thunnus albacares</i>	Spawning, juveniles, adults

NTLs 2009-G39 and 2009-G40 provide guidance and clarification of the regulations (i.e., 50 CFR 600 Subpart J) with respect to biologically sensitive underwater features and areas and benthic communities that are considered EFH. As part of an agreement between BOEM and NMFS to complete a new programmatic EFH consultation for each new Five-Year Program, an EFH consultation was initiated between BOEM’s Gulf of Mexico Region and NOAA’s Southeastern Region during the preparation, distribution, and review of BOEM’s 2024-2029 National OCS oil and gas leasing program Final Programmatic EIS (BOEM, 2023a).

Other HAPCs to protect corals and coral reefs have been identified by the GMFMC (2005). These include the Florida Middle Grounds, Madison-Swanson Marine Reserve, Tortugas North and South Ecological Reserves, Pulley Ridge, and several individual reefs and banks of the northwestern Gulf of Mexico. Jakkula Bank is the HAPC located nearest to the project area (approximately 40 statute miles [64 km]).

IPFs that potentially may affect EFH include drilling rig presence, marine sound, and lights; effluent discharges; water intake; and two types of accidents (a small fuel spill and a large oil spill).

### **Impacts of Drilling Rig Presence, Marine Sound, and Lights**

The drilling rig, as a floating structure in the deepwater environment, will act as FADs with most pronounced effects on epipelagic fishes that include species with EFH designation (Holland, 1990; Higashi, 1994; Relini et al., 1994; Gates et al., 2017). The FAD effect would likely attract and concentrate smaller fish species and thus enhance feeding of epipelagic predators.

Drilling rig sound could potentially cause acoustic masking for fishes, thereby reducing their ability to hear biologically relevant sounds (Radford et al., 2014). Sound may also influence fish behaviors such as predator avoidance, foraging, reproduction, and intraspecific interactions (Picciulin et al., 2010; Brintjes and Radford, 2013; McLaughlin and Kunc, 2015). The only defined acoustic threshold levels for non-impulsive sound are given by Popper et al. (2014) and apply only to species of fish with swim bladders, including some species with EFH designation, that provide some hearing (pressure detection) function. Popper et al. (2014) recommended SPL threshold levels of 170 dB re 1  $\mu$ Pa over a 48-hour period for onset of recoverable injury and an SPL threshold of 158 dB re 1  $\mu$ Pa over a 12-hour period for onset temporary auditory threshold shifts. No consistent behavioral thresholds for fish resulting from non-impulsive sound have been established (Hawkins and Popper, 2014) and the current recommended behavioral threshold for fish is SPL of 150 dB re 1  $\mu$ Pa defined by the Fisheries Hydroacoustic Working Group (2008) for impulsive sound sources. Because the drilling rig is temporary structures, any impacts on EFH for managed species are considered negligible.

### **Impacts of Effluent Discharges**

Other effluent discharges affecting EFH by diminishing ambient water quality include drilling muds and cuttings, treated sanitary and domestic wastes, deck drainage, and miscellaneous discharges such as desalination unit brine and uncontaminated cooling water, fire water, and ballast water. Impacts on water quality have been discussed previously. No detectable impacts on EFH for managed species are expected from these discharges.

### **Impacts of Water Intake**

As noted previously, cooling water intake will cause entrainment and impingement of plankton, including fish eggs and larvae (ichthyoplankton). Due to the limited scope and short duration of drilling activities, any short-term impacts on EFH for highly migratory pelagic fishes are not expected to be biologically significant. The multisale EIS (BOEM, 2017) discusses cooling water discharge. Water with an elevated temperature may accumulate around the discharge pipe. However, the warmer water should be diluted rapidly to ambient temperature levels within 100 m (328 ft) of the discharge pipe. Any impacts to pelagic species would be localized and brief (BOEM, 2014a).

### **Impacts of a Small Fuel Spill**

Potential spill impacts on EFH are discussed by BOEM (2017). For this EP, there are no unique site-specific issues with respect to spill impacts.

The probability of a fuel spill is expected to be minimized by bp's preventative measures during routine operations, including fuel transfer procedures. In the unlikely event of a spill, implementation of bp's ROSRP is expected to help diminish the potential for impacts on EFH. EP Appendix G provides detail on spill response measures. Given the open ocean location of the project area, the duration of a small spill would be brief and the potential for impacts to EFH minimal.

A small fuel spill in offshore waters would produce a slick on the water surface and increase the concentrations of petroleum hydrocarbons and their degradation products. The extent and persistence of impacts would depend on the meteorological and oceanographic conditions at the time of the release and the effectiveness of spill response measures. **Section A.9.1** discusses the likely fate of a small fuel spill and indicates that over 90% would be dissipated naturally within 24 hours (NOAA, 2022). The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions.

A small fuel spill could have localized impacts on EFH for highly migratory pelagic fishes, including tunas, swordfishes, billfishes, and sharks. These species occur as transients in the project area. A spill would produce short-term impact on water quality in the HAPC for spawning bluefin tuna, which covers much of the deepwater Gulf of Mexico. The areal extent of impact from a small fuel spill would represent a negligible portion of the HAPC.

A small fuel spill would not likely affect EFH for corals and coral reefs, the nearest EFH being the topographic features located approximately 30 statute miles (48 km) from the project area. A small fuel spill would float and dissipate on the sea surface and would not contact these features.

### **Impacts of a Large Oil Spill**

Potential spill impacts on EFH are discussed by BOEM (2017; 2023). For this EP, there are no unique site-specific issues with respect to EFH.

An oil spill in offshore waters would temporarily increase hydrocarbon concentrations on the water surface and potentially in the subsurface as well. Given the extent of EFH designations in the Gulf of Mexico (Gulf of Mexico Fishery Management Council, 2005; NMFS, 2009c), some impact from a large oil spill on EFH would be unavoidable.

A large spill could affect EFH for many managed species including shrimps, stone crab, spiny lobster, reef fishes, coastal migratory pelagic fishes, and red drum. It would result in adverse impacts on water quality and consequentially on water column biota including phytoplankton, zooplankton, and nekton. In coastal waters, sediments could be contaminated and result in persistent degradation of the seafloor habitat for managed demersal fish and shellfish species.

The project area is within the HAPC for spawning Atlantic bluefin tuna (NMFS, 2009c). A large spill could temporarily degrade the HAPC due to increased hydrocarbon concentrations in the water column, with the potential for lethal or sublethal impacts on spawning tuna. Potential impacts would depend in part on the timing of a spill, as this species migrates to the Gulf of Mexico to spawn in April, May, and June (NMFS, 2009c).

The topographic features located 30 statute miles (48 km) from the project area are designated as EFH under the corals and coral reefs management plan (GMFMC, 2005). An accidental spill would be unlikely to affect these features, since an oil spill plume or surface slick would be unlikely to reach them due to their shallower depth relative to the project area.

## C.6 Archaeological Resources

### C.6.1 Shipwreck Sites

The archeological assessment identified no archaeologically significant artifacts or shipwrecks within 610 m (2,000 ft) of the proposed wellsites based on an autonomous underwater vehicle survey (bp, 2023). Bp and its contractors will abide by the applicable requirements of NTL 2005-G07 and 30 CFR § 550.194I, which stipulate that work be stopped at the project site if any previously undetected archaeological resource is discovered after work has begun until appropriate surveys and evaluations have been completed.

Because there are no shipwreck sites within 610 m (2,000 ft) of the proposed wellsites, there are no routine IPFs that are likely to affect shipwrecks. The only IPF of relevance to shipwrecks is a large oil spill as listed in **Table 2** are discussed below. A small fuel spill would not affect shipwrecks because the fuel would float and dissipate on the sea surface.

#### Impacts of a Large Oil Spill

The 2017-2023 EIS (BOEM, 2017) estimated that a severe subsurface blowout could resuspend and disperse sediments within a 300-meter (984-feet) radius. Because there are no historic shipwrecks within a 300-meter radius of the proposed wellsite, this impact would not be relevant. Should there be any indication that potential shipwreck sites could be affected, in accordance with NTL 2005-G07, bp will immediately halt drilling or other project operations, take steps to ensure that the site is not disturbed in any way, and contact the BOEM Regional Supervisor, Leasing and Environment, within 48 hours of its discovery. Following shipwreck discovery, all operations within 305 m (1,000 ft) of the site would cease until the Regional Supervisor provides instructions on steps to take to protect the site and assess the potential historic significance.

Beyond this 300-meter (984-feet) radius, there is the potential for impacts from oil, dispersants, and depleted oxygen levels. These impacts could include chemical contamination, alteration of the rates of microbial activity (BOEM, 2017), and reduced biodiversity at shipwreck-associated sediment microbiomes (Hamdan et al., 2018). During the *Deepwater Horizon* incident, subsurface plumes were reported at a water depth of about 1,100 m (3,600 ft), extending at least 22 miles (35 km) from the wellsite and persisting for more than a month (Camilli et al., 2010). While the behavior and impacts of subsurface plumes are not well known, a subsurface plume could have the potential to contact shipwreck sites beyond the 300-meter (984-feet) radius estimated by BOEM (2012a), depending on its extent, trajectory, and persistence.

A spill entering shallow coastal waters could conceivably contaminate an undiscovered or known coastal shipwreck site. BOEM (2012a) stated that if an oil spill contacted a coastal historic site, such as a fort or a lighthouse, the major impact would be a visual impact from oil contact and contamination of the site and its environment.

## C.6.2 Prehistoric Archaeological Sites

With a water depth at the location of the proposed wellsites of approximately 1,247 to 1,284 m (4,092 to 4,211 ft), the proposed project area is well beyond the 60-meter (197-foot) depth contour used by BOEM as the seaward extent for potential prehistoric archaeological sites in the Gulf of Mexico. Because prehistoric archaeological sites are not found in the project area, the only relevant IPF is a large oil spill. A small fuel spill would not affect prehistoric archaeological resources because the oil would float and dissipate on the sea surface.

### Impacts of a Large Oil Spill

Because prehistoric archaeological sites are not found in the project area, they would not be affected by the physical effects of a subsea blowout. BOEM (2012a) estimated that a severe subsurface blowout could resuspend and disperse sediments within a 300-meter (984-foot) radius.

Along the northern Gulf Coast, prehistoric sites exist along the barrier islands and mainland coast and along the margins of bays and bayous (BOEM, 2017). The 30-day OSRA results summarized in **Table 4** estimate that shorelines in Texas and Louisiana could be contacted within 30 days (1% to 4% conditional probability).

If a spill did reach a prehistoric site along these shorelines, it could coat fragile artifacts or site features and compromise the potential for radiocarbon dating of organic materials (other dating methods are available, and it is possible to decontaminate an oiled sample for radiocarbon dating). Coastal prehistoric sites could also be damaged by spill cleanup operations (e.g., by destroying fragile artifacts and disturbing the provenance of artifacts and site features).

## C.7 Coastal Habitats and Protected Areas

Coastal habitats in the northeastern Gulf of Mexico that may be affected by oil and gas activities are described by BOEM (2017) and by Mendelssohn et al (2017). Coastal habitats inshore of the project area include barrier beaches and dunes, wetlands, oyster reefs, and submerged seagrass beds. Generally, most of the northeastern Gulf is fringed by barrier beaches, with wetlands, oyster reefs and/or submerged seagrass beds occurring in sheltered areas behind the barrier islands and in estuaries.

Due to the distance from shore, the only IPF associated with routine activities in the project area that potentially may affect beaches and dunes, wetlands, oyster reefs, seagrass beds, coastal wildlife refuges, wilderness areas, or any other managed or protected coastal area is support vessel traffic from support bases at Port Fourchon and Houma, Louisiana that are not in wildlife refuges or wilderness areas. Potential impacts of support vessel traffic are addressed briefly below.

The only other IPF of relevance for coastal habitats and protected areas is an accidental large oil spill. A small fuel spill in the project area would not affect coastal habitats, as the project area is 116 statute miles (187 km) from the nearest shoreline (Louisiana). As explained in **Section A.9.1**, a small fuel spill would not be expected to make landfall or reach coastal waters prior to dissipating. These IPFs with potential impacts listed in **Table 2** are discussed below.

### **Impacts of Support Vessel Traffic**

Support operations, including crew boats and supply boats as detailed in EP Section 13, may have a minor incremental impact on barrier beaches and dunes, wetlands, oyster reefs and protected areas. Over time, with a large number of vessel trips, vessel wakes can erode shorelines along inlets, channels, and harbors, resulting in localized land loss. Impacts to barrier beaches and dunes, wetlands, oyster reefs and protected areas will be minimized by following the speed and wake restrictions in harbors and channels.

Support operations, including crew boats and supply boats are not anticipated to have a significant impact on submerged seagrass beds. While submerged seagrass beds could be uprooted, scarred, or lost due to direct contact from vessels, use of navigation channels and adherence to local requirements and implemented programs will decrease the likelihood of impacts to these resources (BOEM, 2017).

### **Impacts of a Large Oil Spill**

Potential spill impacts on coastal habitats are discussed by BOEM (2017; 2023a,b). Coastal habitats inshore of the project area include barrier beaches and dunes, wetlands, oyster reefs and submerged seagrass beds. For this EP, there are no unique site-specific issues with respect to coastal habitats.

The 30-day OSRA results summarized in **Table 4** estimate that shorelines in Texas and Louisiana could be contacted within 30 days of a spill (1% to 4% conditional probability).

NWRs and other protected areas along the coast are discussed in BOEM (2017) and bp's ROSRP. Coastal and near-coastal wildlife refuges, wilderness areas, and state and national parks within the geographic range of the potential shoreline contacts based on the 30-day OSRA model (**Table 4**) are presented in **Table 8**. The level of impacts from oil spills on coastal habitats depends on many factors, including the oil characteristics, the geographic location of the landfall, and the weather and oceanographic conditions at the time of the spill (BOEM, 2017).

Table 8. Wildlife refuges, wilderness areas, and state and national parks within the geographic range of the potential shoreline contacts after 30 days of a hypothetical spill from Launch Area 46 based on the 30-day OSRA model.

County or Parish, State	Wildlife Refuge, Wilderness Area, or State/National Park
Calhoun County, Texas	Aransas National Wildlife Refuge
	Chester Island Bird Sanctuary
	Guadalupe Delta Wildlife Management Area
	Matagorda Island Wildlife Management Area
	Welder Flats Wildlife Management Area
Matagorda, Texas	Big Boggy National Wildlife Refuge
	Matagorda Bay Nature Park
	San Bernard National Wildlife Refuge
	West Moring Dock Park
Brazoria, Texas	Brazoria National Wildlife Refuge
	Christmas Bay Coastal Preserve
	Justin Hurst Wildlife Management Area
	San Bernard National Wildlife Refuge
Galveston, Texas	Anahuac National Wildlife Refuge South unit
	Bolivar Flats Shorebird Sanctuary
	Fort Travis Seashore Park
	Galveston Island State Park
	Horseshoe Marsh Bird Sanctuary
	Mundy Marsh Bird Sanctuary
	R.A. Apffel Park
	Seawolf Park
Jefferson, Texas	McFaddin National Wildlife Refuge
	Sea Rim State Park
	Texas Point National Wildlife Refuge
Cameron, Louisiana	Lacassine National Wildlife Refuge
	Sabine National Wildlife Refuge
	Rockefeller State Wildlife Refuge and Game Preserve
	Peveto Woods Sanctuary
Vermilion, Louisiana	Paul J. Rainey Wildlife Refuge and Game Preserve
	Rockefeller State Wildlife Refuge and Game Preserve
	State Wildlife Refuge
Iberia Parish, Vermilion	Marsh Island Wildlife Refuge
	Shell Key National Wildlife Refuge
Terrebonne, Louisiana	Islernièresres Barrier Islands Refuge
	Pointe aux Chenes Wildlife Management Area
Lafourche, Louisiana	Pointe-aux-Chenes Wildlife Management Area
	Wisner State Wildlife Management Area (Includes Picciola Tract)
Plaquemines, Louisiana	Breton National Wildlife Refuge
	Delta National Wildlife Refuge
	Pass-a-Loutre Wildlife Management Area

Coastal wetlands are highly sensitive to oiling and can be significantly affected because of the inherent toxicity of hydrocarbon and non-hydrocarbon components of the spilled substances (Beazley et al., 2012; Lin and Mendelsohn, 2012; Mendelsohn et al., 2012). Numerous variables such as oil concentration and chemical composition, vegetation type and density, season or weather, preexisting stress levels, soil types, and water levels may influence the impacts of oil exposure on wetlands. Impacts to slightly oiled vegetation are considered short term and reversible as recent studies suggest that they will experience plant die-back, followed by recovery without replanting (BOEM, 2012a). Vegetation exposed to oil that persists in wetlands could take years to recover (BOEM, 2017). Vegetation coated with oil experiences the highest mortality rates due to decreased photosynthesis (BOEM, 2012a). A review of the literature and new studies indicated that oil spill impacts to seagrass beds are often limited and may be limited to when oil is in direct contact with these plants (Fonseca et al., 2017). Entrained oil within the sediments of a submerged vegetation area may pose the risk of periodic re-releases of oil in the area, causing potential secondary impacts to the localized area (BOEM, 2023). In addition to the direct impacts of oil, cleanup activities in marshes may accelerate rates of erosion and retard recovery rates (BOEM, 2017). Impacts associated with an extensive oiling of coastal wetland habitat from a large oil spill are expected to be significant.

## **C.8 Socioeconomic and Other Resources**

### **C.8.1 Recreational and Commercial Fishing**

Potential impacts to recreational and commercial fishing were assessed by BOEM (2017). The main commercial fishing activity in deep waters of the northern Gulf of Mexico is pelagic longlining for tunas, swordfishes, and other billfishes (Continental Shelf Associates, 2002; Beerkircher et al., 2009). Pelagic longlining has occurred historically in the project area, primarily during spring and summer seasons. In August 2000, the federal government closed two areas, outside the project area, in the northeastern Gulf of Mexico to longline fishing (65 FR 47214).

Longline gear consists of monofilament line deployed from a moving vessel and generally allowed to drift for 4 to 5 hours (Continental Shelf Associates, 2002). As the mainline is put out, baited leaders and buoys are clipped in place at regular intervals. It takes 8 to 10 hours to deploy a longline and about the same time to retrieve it. Longlines are often set near oceanographic features such as fronts or downwellings, with the aid of sophisticated on-board temperature sensors, depth finders, and positioning equipment. Vessels typically are 10 to 30 m (33 to 98 ft) long, and their fishing trips last from about 1 to 3 weeks.

It is unlikely that any commercial fishing activity other than longlining occurs at or near the project area. Benthic species targeted by commercial fishers occur predominantly on the upper continental slope, well inshore of the project area. Royal red shrimp (*Pleoticus robustus*) are caught by trawlers in water depths of about 250 to 550 m (820 to 1,804 ft) (Stiles et al., 2007). Tilefishes (primarily *Lopholatilus chamaeleonticeps*) are caught by bottom longlining in water depths from about 165 to 450 m (540 to 1,476 ft) (Continental Shelf Associates, 2002).

Most recreational fishing activity in the region occurs in water depths less than 200 m (656 ft) (Continental Shelf Associates, 1997; 2002; Keithly and Roberts, 2017). In deeper water, the main attraction to recreational fishers would be petroleum platforms offshore Texas and Louisiana. Due to the distance from shore, it is unlikely that recreational fishing activity is occurring in the project area.

The only IPFs associated with routine operations that potentially may affect fishing is drilling rig presence which may present an entanglement risk for pelagic longlining. Two types of potential accidents (a small fuel spill and a large oil spill) are the other IPFs of relevance. These IPFs with potential impacts listed in **Table 2** are discussed below.

### **Impacts of Drilling Rig Presence, Marine Sound, and Lights**

There is a slight possibility of pelagic longlines drifting into and becoming entangled in the drilling rig. For example, in January 1999, a portion of a pelagic longline snagged on the acoustic Doppler current profiler of a drillship working in the Gulf of Mexico (Continental Shelf Associates, 2002) and the line was removed without incident. Generally, longline fishers use radar and are aware of offshore structures and ships when placing their sets. Therefore, little or no impact on pelagic longlining is expected.

Because it is unlikely that any recreational fishing activity is occurring in the project area, no adverse impacts are anticipated. Other rig-related factors such as marine sound and lights are not relevant IPFs to commercial or recreational fishing.

### **Impacts of a Small Fuel Spill**

The probability of a fuel spill is expected to be minimized by bp's preventative measures during routine operations, including fuel transfer. In the unlikely event of a spill, implementation of bp's ROSRP is expected to potentially mitigate and reduce the potential for impacts. EP Appendix G provides detail on spill response measures. Given the open ocean location of the project area, the duration of a small spill would be brief and opportunity for impacts to fishing activities would be minimal.

Pelagic longlining activities in the project area, if any, could be interrupted in the event of a small fuel spill. The area of the sea surface with diesel fuel on it would range from 0.5 to 5 ha (1.2 to 12 ac), depending on sea state and weather conditions (see **Section A.9.1**). Fishing activities could be interrupted due to the activities of response vessels operating in the project area. A small fuel spill would not affect coastal water quality because the spill would not be expected to make landfall or reach coastal waters prior to dissipating (see **Section A.9.1**).

### **Impacts of a Large Oil Spill**

Potential spill impacts on fishing activities are discussed by BOEM (2017; 2023a,b). For this EP, there are no unique site-specific issues with respect to this activity.

Pelagic longlining activities in the project area and other fishing activities in the northern Gulf of Mexico could be interrupted in the event of a large oil spill. A spill may or may not result in fishery closures, depending on the duration of the spill, the oceanographic and meteorological conditions at the time of the spill, and the effectiveness of spill response measures. The *Deepwater Horizon* incident provides information about the maximum potential extent of fishery closures in the event of a large oil spill in the Gulf of Mexico (NMFS, 2010a). At its peak on 12 July 2010, closures encompassed 217,821 km<sup>2</sup> (84,101 mi<sup>2</sup>), or 34.8% of the U.S. Gulf of Mexico EEZ.

According to BOEM (2012a; 2017), the potential impacts on commercial and recreational fishing activities from an accidental oil spill are anticipated to be minimal because the potential for oil spills is very low, the most typical events are small and of short duration, and the effects are so

localized that fishers are typically able to avoid the affected area. Fish populations may be affected by an oil spill event should it occur, but they would be primarily affected if the oil reaches the productive shelf and estuarine areas where many fishes spend a portion of their life cycle (BOEM, 2012a). The probability of an offshore spill affecting these nearshore environments is also low. Should a large oil spill occur, economic impacts on commercial and recreational fishing activities would likely occur, but are difficult to predict because impacts would differ by fishery and season (BOEM, 2016b).

## **C.8.2 Public Health and Safety**

There are no IPFs associated with routine operations that are expected to affect public health and safety. A small fuel spill would be unlikely to cause any impacts on public health and safety because it would affect only a small area of the open ocean 116 statute miles (187 km) from the nearest shoreline, and nearly all of the diesel fuel would evaporate or disperse naturally within 24 hours (see **Section A.9.1**). Impacts of a large oil spill are addressed below.

### **Impacts of a Large Oil Spill**

In the event of a large spill from a blowout, the main safety and health concerns are those of the offshore personnel involved in the incident and those responding to the spill. Once released into the water column, crude oil weathers rapidly (National Research Council, 2003a). Depending on many factors such as spill rate and duration, the physical/chemical characteristics of the oil, meteorological, and oceanographic conditions at the time, and the effectiveness of spill response measures, weathered oil may remain present on the sea surface and reach coastal shorelines.

Based on data collected during the *Deepwater Horizon* incident, the health risks resulting from a large oil spill appear to be minimal (Centers for Disease Control and Prevention, 2010). Health risks for spill responders and wildlife rehabilitation workers responding to a major oil spill are similar to the health risks incurred by response personnel during any large-scale emergency or disaster response (U.S. Department of Homeland Security, 2014), which includes the following:

- Possible accidents associated with response equipment;
- Hand, shoulder, or back pain, along with scrapes and cuts;
- Itchy or red skin or rashes due to potential chemical exposure;
- Heat or cold stress depending upon the working environment; and
- Possible upper respiratory symptoms due to potential dust inhalation, allergies, or potential chemical exposure.

Krishnamurthy et al. (2019) identified that exposure to both crude oil and oil dispersant among USCG spill responders during the *Deepwater Horizon* incident was more strongly associated with the suite of acute neurological symptoms that were evaluated than was exposure to oil alone. Those acute neurological symptoms noted in 1% to 3% of responders surveyed included headaches, lightheadedness/dizziness, difficulty concentrating, numbness/tingling sensation, blurred/double vision, and memory loss/confusion. Krishnamurthy et al. (2019) did conduct sensitivity analyses to exclude responders in the highest environmental heat categories and responders with relevant pre-existing conditions due to the symptoms being similar to heat stress.

McGowan et al. (2017) found approximately 1% of responders surveyed were still experiencing symptoms of coughing, wheezing, tightness in chest, shortness of breath, burning in nose, throat, and lungs, burning eyes, itching eyes, and skin irritation within 30 days of the 2011 to 2013 study (1 to 3 years after the oil spill cleanup response).

### **C.8.3 Employment and Infrastructure**

There are no IPFs associated with routine operations that are expected to affect employment and infrastructure. The project involves drilling with support from existing shorebase facilities in Louisiana. No new or expanded facilities will be constructed, and no new employees are expected to move permanently into the area. The project will have a negligible impact on socioeconomic conditions such as local employment, existing offshore and coastal infrastructure (including major sources of supplies, services, energy, and water), and minority and lower income groups. A small fuel spill that dissipates within a few days would have little or no economic impact as the spill response would use existing facilities, resources, and personnel. Impacts of a large oil spill are addressed below.

#### **Impacts of a Large Oil Spill**

Potential socioeconomic impacts of an oil spill are discussed by BOEM (2017). For this EP, there are no unique site-specific issues with respect to employment and coastal infrastructure. A large spill could cause economic impacts in several ways: it could result in extensive fishery closures that put fishermen out of work; it could result in temporary employment as part of the response effort (including the establishment of spill response staging areas); it could result in adverse publicity that affects employment in coastal recreation and tourism industries; and it could result in suspension of OCS drilling activities, including service and support operations that are an important part of local economies.

Non-market effects such as traffic congestion, strains on public services, shortages of commodities or services, and disruptions to the normal patterns of activities or expectations could also occur in the short-term. These negative, short-term social and economic consequences of a spill are expected to be modest in terms of projected cleanup expenditures and the number of people employed in cleanup and remediation activities (BOEM, 2017). Net employment impacts from a spill would not be expected to exceed 1% of baseline employment in any given year (BOEM, 2017).

### **C.8.4 Recreation and Tourism**

There are no known recreational uses of the project area. Recreational resources and tourism in coastal areas would not be affected by any routine activities due to the distance from shore. Compliance with NTL BSEE-2015-G03 is intended to minimize the chance of trash or debris being lost overboard from the drilling rig and subsequently washing up on beaches. A small fuel spill in the project area would be unlikely to affect recreation and tourism because, as explained in **Section A.9.1**, it would not be expected to make landfall or reach coastal waters prior to dispersing naturally.

## Impacts of a Large Oil Spill

Potential impacts of an oil spill on recreation and tourism are discussed by BOEM (2017; 2023). For this EP, there are no unique site-specific issues with respect to these impacts.

Impacts on recreation and tourism would vary depending on the duration of the spill and its fate, including the effectiveness of response measures. A large spill that reached coastal waters and shorelines could adversely affect recreation and tourism by contaminating beaches and wetlands, resulting in negative publicity that encourages people to stay away. The 30-day OSRA results summarized in **Table 4** estimate that shorelines in Texas and Louisiana could be contacted within 30 days (1% to 4% conditional probability).

According to BOEM (2017), should an oil spill occur and contact a beach area or other recreational resource, it could cause some disruption during the impact and cleanup phases of the spill. In the unlikely event that a spill occurs that is sufficiently large to affect large areas of the coast and, through public perception, have effects that reach beyond the damaged area, effects to recreation and tourism could be significant (BOEM, 2012a).

### C.8.5 Land Use

Land use along the northern Gulf coast is discussed by BOEM (2017; 2023a,b). There are no routine IPFs that potentially may affect land use. The project will use existing onshore support facilities in Louisiana where land use is industrial. The project will not involve any new construction or changes to existing land use and, therefore, will not have any impacts. Levels of boat and helicopter traffic as well as demand for goods and services including scarce coastal resources, will represent a small fraction of the level of activity occurring at the shorebases.

A large oil spill is the only relevant IPF. A small fuel spill should not have any impacts on land use, as the response would be staged out of existing shorebases and facilities.

## Impacts of a Large Oil Spill

The initial response for a large oil spill would be staged out of existing facilities, with no expected effects on land use. A large spill could have limited temporary impacts on land use along the coast if additional staging areas were needed. For example, during the *Deepwater Horizon* incident, temporary staging areas were established in Louisiana, Mississippi, Alabama, and Florida for spill response and cleanup efforts. In the event of a large spill in the project area, similar temporary staging areas could be needed. These areas would eventually return to their original use as the response is demobilized. It is not expected that a large oil spill and subsequent cleanup would substantially reduce available space in nearby landfills or decrease their usable life (BOEM, 2014a).

An accidental oil spill is not likely to significantly affect land use and coastal infrastructure in the region, in part because an offshore spill would have a small probability of contacting onshore resources. BOEM (2016b) states that landfill capacity would probably not be an issue at any phase of an oil spill event or the long-term recovery. In the case of the *Deepwater Horizon* incident and response, the USEPA reported that existing landfills receiving oil spill waste had plenty of capacity to handle waste volumes; the wastes that were disposed of in landfills represented less than 7% of the total daily waste normally accepted at these landfills (USEPA, 2016).

### C.8.6 Other Marine Uses

The project area is not located within any USCG-designated fairway, shipping lane, or Military Warning Area. bp intends to comply with BOEM requirements and lease stipulations to avoid impacts on uses of the area by military vessels and aircraft. The site clearance letter for the proposed wellsites identified numerous existing wellsites and associated subsea infrastructure in the vicinity of the project area (bp, 2023).

There are no IPFs from routine project activities that are likely to affect other marine uses of the project area. A large oil spill is the only relevant IPF. A small fuel spill would not have any impacts on other marine uses because spill response activities would be mainly within the project area and the duration would be brief.

#### Impacts of a Large Oil Spill

A large accidental spill would be unlikely to significantly affect shipping or other marine uses. The project area is not located within any USCG-designated fairway, shipping lane, or Military Warning Area. In the event of a large spill requiring numerous response vessels, coordination would be required to manage the vessel traffic for safe operations. bp and its contractor intend to comply with BOEM requirements and lease stipulations to avoid impacts on uses of the area by military vessels and aircraft.

### C.9 Cumulative Impacts<sup>3</sup>

Prior Studies. BOEM prepared a multi-lease sale EIS in which it analyzed the environmental impact of activities that might occur in the multi-lease sale area. The level and types of activities planned in bp's EP are within the range of activities described and evaluated by BOEM in the 2024 to 2029 Programmatic Environmental Impact Statement for the OCS Oil and Gas Leasing Program (BOEM, 2023a) and the 2017 to 2022 Programmatic Environmental Impact Statement for the OCS Oil and Gas Leasing Program (BOEM, 2016a), and the Final Programmatic EIS for Gulf of Mexico OCS Oil and Gas Lease Sales 2017-2022 (BOEM, 2017). Past, present, and reasonably foreseeable activities were identified in these documents, which are incorporated by reference. The proposed action should not result in any additional impacts beyond those evaluated in the multi-lease sale and Final EISs (BOEM, 2012a; 2013; 2014a; 2015; 2016b; 2017; 2023a,b).

Description of Activities Reasonably Expected to Occur in the Vicinity of Project Area. Other exploration and development activities may occur in the vicinity of the project area but bp does not anticipate other projects beyond the types analyzed in the lease sale and Supplemental EISs (BOEM, 2012a; 2013; 2014a; 2015; 2016b; 2017; 2023a,b).

Cumulative Impacts of Planned Actions. The BOEM (2017) Final EIS included a discussion of cumulative impacts, which analyzed the incremental environmental and socioeconomic impacts of the 10 proposed lease sales, in addition to all activities (including non-OCS activities) projected to occur from past, proposed, and future lease sales. The EIS considered exploration, delineation, and development wells; platform installation; service vessel trips; and oil spills. The

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<sup>3</sup> On May 20, 2022, the National Environmental Policy Act (NEPA) original requirements came into effect and were reinstated by the Council on Environmental Quality (CEQ), which is responsible for Federal agency implementation of NEPA.

EIS examined the potential cumulative effects on each specific resource for the entire Gulf of Mexico.

The level and type of activity proposed in bp's EP are within the range of activities described and evaluated in the recent lease sale EISs. The EIA incorporates and builds on these analyses by examining the potential impacts on physical, biological, and socioeconomic resources from the work planned in bp's EP, in conjunction with the other reasonably foreseeable activities expected to occur in the Gulf of Mexico. For all impacts, the incremental contribution of bp's proposed actions to the analyses in these prior reports are not expected to be significant.

## **D. Environmental Hazards**

### **D.1 Geologic Hazards**

The site clearance letter did not identify geologic hazards at the location of the proposed wellsites (bp, 2023). See EP Section 3 for supporting geological and geophysical information.

### **D.2 Severe Weather**

Under most circumstances, weather is not expected to have any effect on the proposed activities. Extreme weather, including high winds, strong currents, and large waves, was considered in the design criteria for the drilling rig selected for this project. High winds and limited visibility during a severe storm could disrupt support activities (vessel and helicopter traffic) and make it necessary to implement bp contingency plans to suspend some activities on the drilling rig for safety reasons until the storm or weather event passes. From 1992 to 2022, 48 tropical storms and/or hurricanes have shut down oil and gas activities in the Gulf of Mexico (BSEE, 2023). Damage was minimal from the storms in 2017 to 2023, and only Hurricane Ida in 2021 caused an accidental release from a ruptured pipeline and wellhead off the Louisiana coastline (BOEM, 2023b).

In the event of severe weather, guidance as outlined in bp's and/or bp's drilling contractor's site-specific Environmental Emergency Plan, its site-specific hurricane preparation checklist, and the Gulf of Mexico Region Severe Weather Contingency Plan would be adhered to.

### **D.3 Currents and Waves**

Meteorology and physical oceanography conditions such as sea states, wind speed, ocean currents, etc. will be continuously monitored. Under most circumstances, physical oceanographic conditions are not expected to have any effect on the proposed activities. Strong currents (e.g., caused by Loop Current eddies and intrusions) and large waves were considered in the design criteria for the drilling rig selected for this project. High waves during a severe storm could disrupt support activities (i.e., vessel and helicopter traffic), and risks to the drilling program brought on by such conditions would be closely monitored and managed by the team managing the project. In some cases, it may be necessary to suspend some activities on the drilling rig for safety reasons until the storm or weather event passes.

## E. Alternatives

No formal alternatives were evaluated in the EIA for the proposed project. However, various technical and operational options, including the location of the wellsite and the selection of a potential drilling unit, were considered by bp. The activity being proposed is the result of a rigorous screening and right-scoping process. It was selected as the best design candidate to reduce risk and optimize deliverability, chosen from numerous options with varying well locations, trajectories, construction designs, and drilling strategies, amongst other variables.

## F. Mitigation Measures

The proposed program includes numerous processes and actions that are intended to mitigate potential impact to the environment. The project is expected to comply with applicable federal, state, and local requirements as well as permit conditions of approval concerning protected species, air pollutant emissions, discharges to water, and waste management.

In addition, bp and its drilling contractor intend to implement the following specific measures to prevent marine pollution:

- Proper job planning is an important overall mitigation measure. The fundamental concept and discussion in the pre-tour and pre-job safety meetings is the prevention of harm to people and the environment. Personnel are reminded daily to inspect work areas for safety issues as well as potential pollution issues.
- Per Safety and Environmental Management System requirements, the skills and knowledge of personnel are assessed prior to working offshore for bp.
- Equipment transferred to and from the drilling rig will be inspected to ensure pollution pans have been cleaned and to confirm that plugs have been installed prior to leaving the dock and prior to loading on the boat.
- Preventive maintenance of rig and vessel equipment and other service equipment, including visual inspection of hydraulic lines and reservoirs, will be conducted on a scheduled basis.
- Items deemed safety and environmentally critical are listed and managed on a schedule recommended by the manufacturer/operator.
- Waste generation and storage will be managed as per the bp Gulf of Mexico Waste Management procedures and/or the drilling contractor's established waste management procedures. Wastes are expected to be categorized, packaged, labeled, stored, manifested, and shipped to an appropriately permitted disposal site.
- Municipal trash containers will be kept covered. Where applicable, trash destined for recycling will be compacted.
- Chemical drums and totes will be stored on containment skids in designated areas of the rig.
- Hazardous waste shall be placed in approved containers on the rig.
- Rig fuel vents will have containment boxes.

- All municipal, non-hazardous, hazardous, and universal wastes are placed in an applicable recycling bag or box, Omega bin, Department of Transportation Drum, cutting box, universal box, waste bin, E&P Drum, tote tank or NORM container, labelled, and shipped to shore via a rig support vessel.
- Tank overflow, discharge overflow spill prevention fittings, as well as quick disconnect hoses will be installed on hydrocarbon-based fluid hoses and liquid mud hoses to ensure isolation of any hose failures.
- On-site spill kits are inspected regularly and re-stocked as needed.
- Drills are conducted regularly, often engaging the IMT onshore to measure the effectiveness and quality of processes deployed to address oil spill scenarios.
- Fuel hoses and SBM hoses will be changed based on the maintenance schedule of the drilling rig and in accordance with USCG regulation annual inspection.

## G. Consultation

No persons or agencies other than those listed as Preparers (**Section H**) were consulted during the preparation of the EIA.

## H. Preparers

The EIA was prepared by CSA Ocean Sciences Inc. Contributors included:

- John M. Tiggelaar II (Project Scientist);
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## Appendix J: New Technology

<b>Title of Document:</b>	Initial Exploration Plan – Far South	<b>Document Number:</b>	GM001-DR-PLN-600-00375730
<b>Authority:</b>	Brenda Linster	<b>Revision</b>	0
<b>Custodian/Owner:</b>	Adalberto Garcia	<b>Issue Date:</b>	06/11/2024
<b>Retention Code:</b>	ADM3000	<b>Next Review Date (if applicable):</b>	
<b>Security Classification:</b>		<b>Page:</b>	Page 39 of 40
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## MPD for GoM Exploration Wells

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### Context

Managed Pressure Drilling (MPD) is defined by the International Association of Drilling Contractors (IADC) as “An adaptive drilling process used to precisely control the annular pressure profile throughout the wellbore.” The ability to control the annular pressure profile facilitates remaining within the downhole pressure limits imposed by the well’s Pore Pressure Fracture Gradient (PPFG) and including additional factors like wellbore stability and trip margin. A study conducted by the Drilling Engineers Association on behalf of the U.S. Department of Interior Minerals Management Service concluded “MPD is as safe as or safer than conventional offshore drilling” (Malloy, 2008).

### Background

BP has been using Surface Back Pressure (SBP) MPD to successfully deliver complex High Pressure High Temperature (HPHT) exploration wells in Egypt since 2007. This MPD method has many advantages for this environment, where geological uncertainty and associated challenges often lead to high Non-Productive Time (NPT) or inability to deliver exploration objectives. BP has also used this method to successfully deliver a shallow water deep gas exploration well in the GoM in 2009. The advantages of this method in exploration wells have long been established.

It is worth mentioning that the SBP method is not limited to exploration and appraisal wells, and it has been used successfully within BP to drill development wells where the high mud weight required for wellbore stability leads to a narrow drilling window and an increased risk of losses in depleted sands.

### SBP MPD Theory

SBP MPD, often referred to within the industry as Constant Bottom Hole Pressure (CBHP), uses surface pressure to supplement a lighter than conventional mud weight to maintain an overbalanced condition. This technique enables maintaining a near constant pressure throughout the open hole well bore when both dynamic and static. This prevents the pressure cycling experienced by the open hole well bore which can cause well bore fatigue and lead to underbalanced conditions (i.e. kicks taken at pumps off events). The ability to apply SBP reduces the well control risk of allowing an influx during pumps off events and on trips. The system also provides an early kick and loss detection capability through the use of pressure monitoring and high accuracy flow rate monitors such as a Coriolis meter.

### Benefits of SBP MPD for Exploration wells in GoM

GoM deepwater exploration wells, particularly sub-salt, face many challenges such as:

1. PPFG uncertainty, particularly with poor seismic imaging sub-salt.
2. Tight operating window between Pore Pressure and Fracture Gradient, which may potentially increase the risk of losses or well control issues.

3. Equivalent Circulating Density (ECD) management.
4. Risk and time associated with riser gas events.
5. Wellbore ballooning.
6. Challenges associated with salt exit uncertainty
7. Difficulty tripping out or pumping of hole due to narrow window and swabbing / losses.

SBP MPD allows managing and mitigating these challenges through the ability to control bottomhole pressure and maintain it near constant. Benefits of SBP MPD for exploration wells may include:

1. Early Kick/Loss detection.
2. Fast and Precise control of BHP.
3. Constant BHP reduces or eliminates ballooning. Unmanageable wellbore ballooning is a common cause for high NPT and failure to reach Total Depth (TD) objectives in exploration and HPHT environments.
4. Allows identification of operating window boundaries. A dynamic Formation Integrity Test (FIT) can be quickly carried out to test wellbore integrity prior to making any changes to mud weight.
5. Allows tripping out with surface pressure to mitigate swabbing effects, instead of pumping out or raising Mud Weight (MW).
6. The SBP system provides a safer and more efficient well and riser degassing method for floating operations.

#### **BP use of SBP MPD for Exploration wells in GoM**

The SBP MPD method is the MPD method which is most suitable to address the drilling challenges encountered in GoM exploration, as it is more suited to deal with well challenges such as geological uncertainty, tight PPFG window, well bore ballooning and well bore stability with rapid response capabilities to react to changing down hole conditions by adjusting the BHP precisely and quickly. In addition, the SBP MPD system provides additional techniques to examine the well bore boundaries of the PPFG by performing well bore bleed downs and dynamic FITs.

#### **SBP MPD equipment for Exploration wells in GoM**

The SBP MPD equipment package will be detailed in a technology permit submitted and approval sought from BSEE for each rig equipped with MPD.

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## Appendix K: Fees Recovery

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<b>Title of Document:</b>	Initial Exploration Plan – Far South	<b>Document Number:</b>	GM001-DR-PLN-600-00375730
<b>Authority:</b>	Brenda Linster	<b>Revision</b>	0
<b>Custodian/Owner:</b>	Adalberto Garcia	<b>Issue Date:</b>	06/11/2024
<b>Retention Code:</b>	ADM3000	<b>Next Review Date (if applicable):</b>	
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## Receipt

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### Tracking Information

Pay.gov Tracking ID: 27F5EEEEA

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Form Name: BOEM Exploration Plan

Application Name: BOEM Exploration Plan - BF

### Payment Information

Payment Type: Debit or credit card

Payment Amount: \$8,696.00

Transaction Date: 06/10/2024 04:49:57 PM EDT

Payment Date: 06/10/2024

Region: Gulf of Mexico

Contact: Adalberto Garcia (281) 995-2815

Company Name/No: BP Exploration & Production Inc., 02481

Lease Number(s): 36297

Area-Block: Green Canyon GC,584

Surface Locations: 2

### Account Information

Cardholder Name: Adalberto Garcia

Card Type: Master Card

Card Number: \*\*\*\*\*1978